Aalto University
School of Business

Environmental responsibility disclosure of publicly listed companies in Finland

Master's Thesis

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Abstract of master's thesis

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Abstract

Environmental challenges such as climate change have increased environmental awareness of the public around the world. This has resulted in increasing societal demand for environmental sustainability of commercial organizations and in increased policy pressure for environmental regulation. Many of the regulation programs are addressing corporations' disclosure of environmental information. Different company stakeholders such as investors, employees and customers are increasingly demanding social and environmental sustainability and transparency. Also, environmental sustainability has great economic potential for companies.

The purpose of this thesis was to evaluate the extent of environmental responsibility disclosure of publicly listed companies on Helsinki Stock Exchange. Thus, the aim was to increase understanding on how extensively the companies included in the research are communicating on the effects that their operations are causing to the environment and to compare the results with different company characteristics which in this research were the companies' industry, size, profitability, board size and share of women on the board of directors. There are total of 129 companies listed in the Helsinki Stock Exchange of which 53 companies released the GRI report in 2017. Thus, 41% of the companies listed in Helsinki Stock Exchange are included in the study. To evaluate and quantify the environmental responsibility disclosure transparency, a disclosure index was created for each company by examining the share of disclosed GRI indices.

The theoretical framework is based on earlier research on corporate social responsibility and corporate environmental sustainability. Hypotheses of the study were developed with the help of the utilized theories. The hypotheses which were concerning the relationship between the extent of environmental disclosure and different company characteristics were evaluated by utilizing correlation analysis and regression analysis.

The findings suggest that Finnish publicly listed companies are disclosing relatively little amount of information on their environmental sustainability and performance. Of the five hypotheses one was accepted. The company characteristic which positively affected the level of environmental disclosure was company size. The main contribution of this thesis to the existing knowledge is that it elicits information on the subject in the Finnish context and with multiple different industries. The results can be used to compare environmental reporting of commercial organizations between different countries.

Keywords environmental disclosure, corporate social responsibility, environmental performance, Global Reporting Initiative

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Tiivistelmä

Globaalit ympäristöongelmat kuten ilmastonmuutos ovat lisänneet kansalaisten ympäristötietoisuutta kaikkialla maailmassa. Ympäristöön liittyvien ongelmien ja tietoisuuden lisääntyminen ovat johtaneet kasvaneeseen sosiaaliseen ja poliittiseen paineeseen yrityksiä kohtaan. Yrityksiltä vaaditaan ympäristön huomioimista ja ympäristövaikutustensa laajempaa raportointia. Eri sidosryhmät, kuten sijoittajat, työntekijät ja asiakkaat vaativat yhä enemmän sosiaalista ja ympäristöllistä vastuullisuutta ja avoimuutta. Ympäristövastuullisuus luo myös suuren taloudellisen mahdollisuuden yrityksille.

Tutkimuksen tarkoituksena oli arvioida Suomessa toimivien pörssiyhtiöiden ympäristöä koskevien tietojen raportointia. Tavoitteena oli näin ollen lisätä ymmärrystä siitä, kuinka laajasti pörssiyhtiöt raportoivat toimintansa vaikutuksista ympäristöön ja vertailla tuloksia eri yritysominaisuuksiin, jotka tässä tutkimuksessa ovat yritysten toimiala, yrityskoko, kannattavuus, hallituksen koko ja naisten osuus hallituksessa. Helsingin pörssissä oli listattuna yhteensä 129 yhtiötä, joista 53 julkaisi GRI -raportin vuonna 2017. Näin ollen tutkimukseen sisältyy noin 41% listatuista yhtiöistä. Ympäristövastuun raportoinnin laajuuden arvioimiseksi ja mittaamiseksi kullekin yritykselle luotiin raportointi-indeksi tutkimalla julkistettujen GRI-indeksien laajuutta.

Tutkimuksen teoreettinen viitekehys perustuu aikaisempaan tutkimukseen yritysten yhteiskunta- ja ympäristövastuusta. Tutkimuksen hypoteesit kehitettiin käytettyjen teorioiden avulla. Ympäristöraportoinnin laajuuden ja yritysominaisuuksien välistä suhdetta koskevat hypoteesit arvioitiin käyttämällä korrelaatioanalyysiä ja regressioanalyysia.

Tulokset viittaavat siihen, että suomalaiset julkisesti noteeratut yhtiöt julkaisevat suhteellisen vähän tietoa toimintansa ympäristövaikutuksista kansainvälisesti verrattuna. Viidestä hypoteesista yksi hyväksyttiin. Yritysominaisuus jolla oli positiivinen vaikutus ympäristötiedon raportoinnin laajuuteen, oli yrityskoko. Tutkimus tuo uutta tietoa yritysten ympäristöraportoinnin laajuudesta, sekä laajuuden ja yritysominaisuuksien välisestä suhteesta useilla eri toimialoilla ja Suomen kontekstissa toteutettuna. Tutkimuksen tuloksia voidaan verrata yritysten ympäristöraportoinnin laajuuteen eri maissa.

Avainsanat ympäristöraportointi, yhteiskuntavastuu, ympäristövaikutukset, GRI-ohjeisto

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1 Introduction

The growing concern on negative environmental impacts caused by human action and economic growth since 19th century is increasing environmental awareness. This causes pressure on businesses to be transparent on their environmental performance and to report on the environmental effects that their operations are causing. Global environmental problems such as climate change and global warming are often in the public discourse perceived to be to a large extent caused by environmentally unsustainable production systems and business models. It is often argued that economic growth is one the main contributors of the human caused environmental degradation (Huwart & Verdier 2013, 113). Thus, the impact of businesses on environment has become a global concern. Environmental problems such as depleting natural resources, degradation of natural eco-systems and climate change are strongly shaping consumer preferences and increasing the pressure on commercial organizations to act in an environmentally sustainable way and heed these concerns in their production and reporting (Walker 2008, 120.)

Environmental sustainability has come strongly into the focus of discussion and research of corporate sustainability during the recent decades. Wide range of different stakeholder groups are increasingly interested in the environmental performance of commercial organizations (Smaliukiene 2007, 216). Consumers, employees, investors, media, industry and trade associations, environmental groups, opinion leaders, local communities, international non-governmental organizations, academia and governments are all interested in the environmental performance of organizations and increasingly pressuring companies for environmental transparency (Gallego-Álvarez & Quina-Custodio 2016, 220). This development has created a strong need for commercial organizations to communicate on their environmental performance more extensively. Walker (2008) argues in his article that environmental sustainability is becoming an increasingly important and integral part of strategy for many organizations. Transparent environmental disclosure can bring a competitive advantage for companies. It can be an effective way of enhancing the public image of an organization and increase its appeal for environmentally aware consumers who carefully evaluate the environmental

sustainability of the products and services they're using. Environmentalism is one of the most prominent and pervasive social trends globally in the 21st century, and it has substantially affected the way consumers behave (Walker 2008, 120). Environmental sustainability is a competitive advantage for commercial organizations all over the world because consumers are increasingly coercing companies to act in an environmentally sustainable way through their purchasing power (Smaliukiene 2007, 217). Environmentalism is also strongly influencing governmental policies, laws and regulations. After the global financial crisis, which started in 2008, the European Union has started to focus more on the social and environmental transparency of companies (Matuszak & Różańska 2017, 2). In 2014, the European Union enacted the directive 2014/95/EU on disclosure of non-financial information. The directive was promulgated on 1.1.2017. The directive aims at increasing environmental transparency and sustainability of commercial organizations. The directive requires large organizations to disclose social and environmental information, and therefore it is now required also by the law in all EU countries to disclose certain environmental information for the public and authorities: "Where undertakings are required to prepare a non-financial statement, that statement should contain, as regards environmental matters, details of the current and foreseeable impacts of the undertaking's operations on the environment, and, as appropriate, on health and safety, the use of renewable and/or non-renewable energy, greenhouse gas emissions, water use and air pollution." (European Parliament and the Council 2014, Directive 2014/95/EU, section 7).

Environmental transparency is demanded by all stakeholders of commercial organizations, although for different reasons. Reporting only financial performance is not enough anymore for customers and other stakeholders of companies. Companies are increasingly focusing on the "triple bottom line" reporting framework which consists of three parts: economic, social and environmental performance (Walker 2008, 121). John Elkington (1999) developed the framework to establish a wider definition of the value that businesses generate, and to increase their accountability also on other metrics than just monetary profits. The triple bottom line framework has been adopted by many commercial, non-profit and governmental organizations during the last few decades (Slaper & Hall 2011, 4.) This development indicates the growing emphasis placed on

environmental performance and transparency in recent years. Environmentalism is substantially affecting the way in which environmental performance is integrated into strategy, management and reporting of commercial organizations. The objective of the framework is to address the interdependence of all the three different parts, also, to quantitatively incorporate social and environmental aspects into management and accounting systems of organizations.

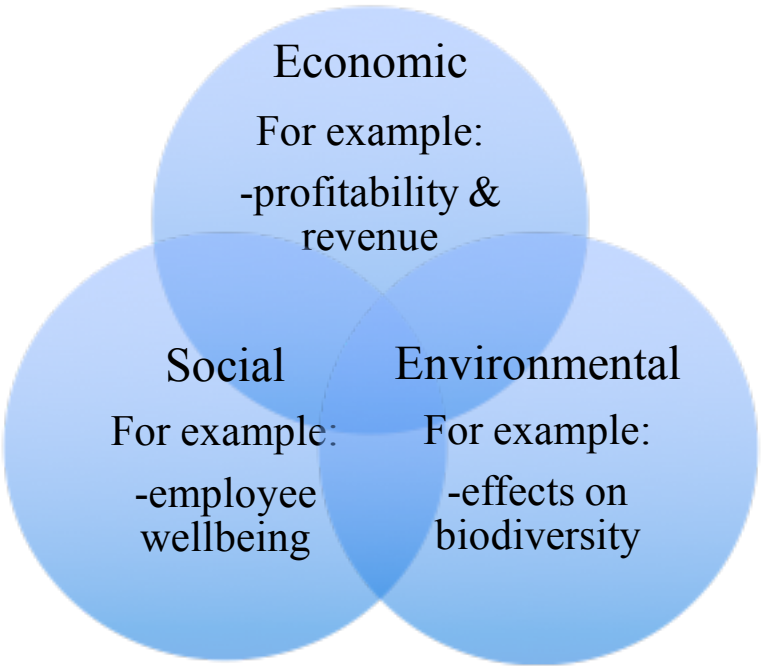

Figure 1. Triple bottom line framework (source: authors depiction from the text of Walker 2008)

Environmental problems affect companies in multiple different ways. They affect companies directly by increasing resource scarcity, extreme weather conditions, environmental regulation, reputational risks and market pressure. Because of the interconnectedness of global economy all companies are at least indirectly affected by environmental problems such as global warming. Businesses are exposed to both systemic risks which have effects on whole economy and to specific risks at industry, sector and company levels (Agrawala, Carraro, Kingsmill, Mullan & Prudent-Richard 2011, 13).

1.1 Global Reporting Initiative

The Global Reporting Initiative (hereinafter referred to as GRI) is an international and independent organization which is providing sustainability reporting standards for governmental, business and non-profit organizations. The GRI was founded in 1997 in the United States by a non-profit organization, the Coalition for Environmentally Responsible Economies (CERES). In 1999, the United Nations Environment Programme (UNEP) joined as a partner of the initiative. (Belkhir, Bernard & Abdelgadir 2017, 139)

The object of the initiative was to establish an internationally usable and commonly agreed sustainability framework to consolidate sustainable development and enhance sustainability reporting's transparency, comparativeness and consistency. GRI aims at increasing the transparency of organizations' sustainability reporting so that various stakeholder groups such as investors, customers and employees can make more sustainable decisions on investing or buying products of different companies (Marimon, Alonso-Almeida, Rodríguez & Alejandro 2012, 134). Today the GRI sustainability standards are the most widely used international sustainability reporting standards, and majority of large companies worldwide are reporting in accordance with the GRI standards (Gallego-Álvarez & Quina-Custodio 2016, 219). The GRI reporting framework is an extensive and detailed set of sustainability indicators which help to make abstract entities easily comparable and more tangible for different stakeholders. The GRI standards comprises universal standards and three series of topic specific standards: economic, social and environmental. This research is focusing on the 34 different environmental indicators of GRI G4 standards.

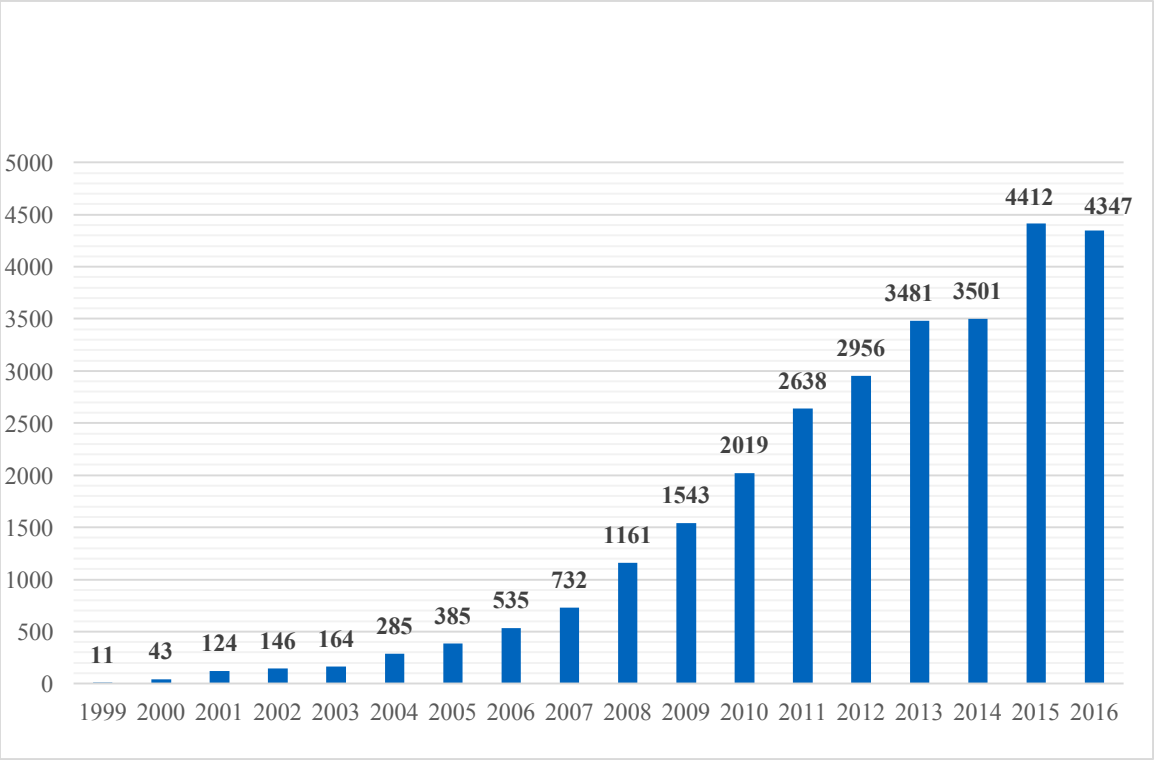

Figure 2. Number of organizatios in the world which published a sustainability report following GRI standards from 1999 to 2016 (Author's own representation. Source: GRI database)

The usage of GRI guidelines is completely voluntary, so companies which are reporting in accordance with GRI may freely choose which of the indicators they are reporting. In practice, many companies are reporting very selectively the indicators, and they do not necessarily need to impart any reasons for omitting certain indicators. Companies may also disclose information on a specific indicator only partially. Therefore, companies have three different scopes in which they may choose to report on an indicator: fully, partly or not at all. Therefore, reporting in accordance with the GRI standards does not necessarily mean that that the organization is releasing particularly extensive or transparent reports. For example, companies might selectively focus to report the only those indicators which seem good outside to different stakeholders. This study examines all the environmental parts of the reports of the companies listed in Helsinki Stock Exchange which are reporting in accordance with the GRI standards.

1.2 Research questions

The purpose of this thesis is to examine and analyze the environmental corporate social responsibility disclosures of publicly listed companies in Helsinki Stock Exchange operating in various industries. The aim is to increase understanding on how extensively the companies included in the research are communicating on their effects on environment and their actions on environmental issues, and to compare the results with different company characteristics which in this research are the companies' industry, size, profitability, board size and share of women on the board of directors. Selection of these company characteristics, as well as the research methods of this study are based on earlier research. The methods of this research are based especially on the study by Gallego-Álvarez & Quina-Custodio (2016).

There are two main research questions in this thesis:

1. To what extent are publicly listed companies in Finland disclosing information on their environmental performance measured by GRI environmental indicators?

2. Do some company characteristics affect the scope of environmental disclosure?

There were 53 publicly listed companies in Finland which released sustainability report made in accordance with GRI standards in 2017 and all of them are included in the study. Selective sustainability reporting is potentially providing chance for misrepresentation for companies which are pursuing to appear as sustainable and transparent (Munoz, Zhao & Yang 2017, 67). Companies may appear as more transparent if they publish the GRI report, even though the publishing alone does not mean anything because companies may for example report only a fraction of all the indicators. Thus, it is interesting from the point of view of transparency to examine how extensively are companies in Finland disclosing the environmental GRI indicators and if they are selectively omitting certain indicators. Munoz et al. (2017) argue that at least some sustainability indicators should be mandated to prevent the potential disclosure

bias (2017, 67). The EU directive 2014/95/EU on disclosure of non-financial information is therefore mitigating this potential problem in EU countries.

Earlier research literature on corporate social responsibility suggests that companies which are operating in industries associated with heavy and negative impacts on environment such as energy industry and heavy industry are disclosing more extensively information on their operation's effects on environment than companies on industries associated with less negative environmental effects (Dyduch and Krasodomska 2017, 8). Dyduch and Krasodomska (2017) suggest that arises from the need to create a more positive social image on environmental matters. For example, companies in heavy industries and petroleum industries are more prone to brandishing their environmental image through comprehensive and transparent environmental reporting. This study aims to examine and resolve if this pattern occurs also in the context of Finland. The industry of each company is defined by the Finnish Foundation for Share Promotion's industry classification. The industry categories are: "oil and gas", "basic industry", "industrial products and services", "consumer goods", "healthcare", "consumer services", "telecommunications services", "services of general interest", "finance" and "technology". This study will also examine the potential differences in environmental disclosure index when the companies are categorized into manufacturing and non-manufacturing companies.

1.3 Structure of the thesis

The purpose of the first introductory section is to present the background for the subject of the thesis and to define the most important terms used later in the study. The first part of the second section consists of a literature review on global environmental challenges and their implications on business and the global economic system. Through the literature review the aim is to enhance understanding of the various and complicated effects that global environmental problems such as depleting natural resources, loss of biodiversity, pollution, extreme weather conditions, global warming and climate change

are having on companies and business in general all over the world. The second part of the section discusses a few essential theories on corporations' environmental responsibility. Third part of the second section presents 12 essential prior studies on the subject. First part of the third section depicts the theoretical framework for the design of the empirical part of the study. The theoretical framework is based on earlier research on environmental reporting. The section discusses different approaches and essential theories which enable and justify the research framework used in the thesis. In the second part of the section the hypotheses developed for this study are presented and elaborated on. The fourth section presents the methods which are utilized in the empirical part of the study. In the fifth section the sample of companies, research sources, information, variables, methodology of content analysis and analyzed company characteristics are presented in detail. In the sixth section the results are presented. The final section discusses the results and summarizes the conclusions achieved in the study.

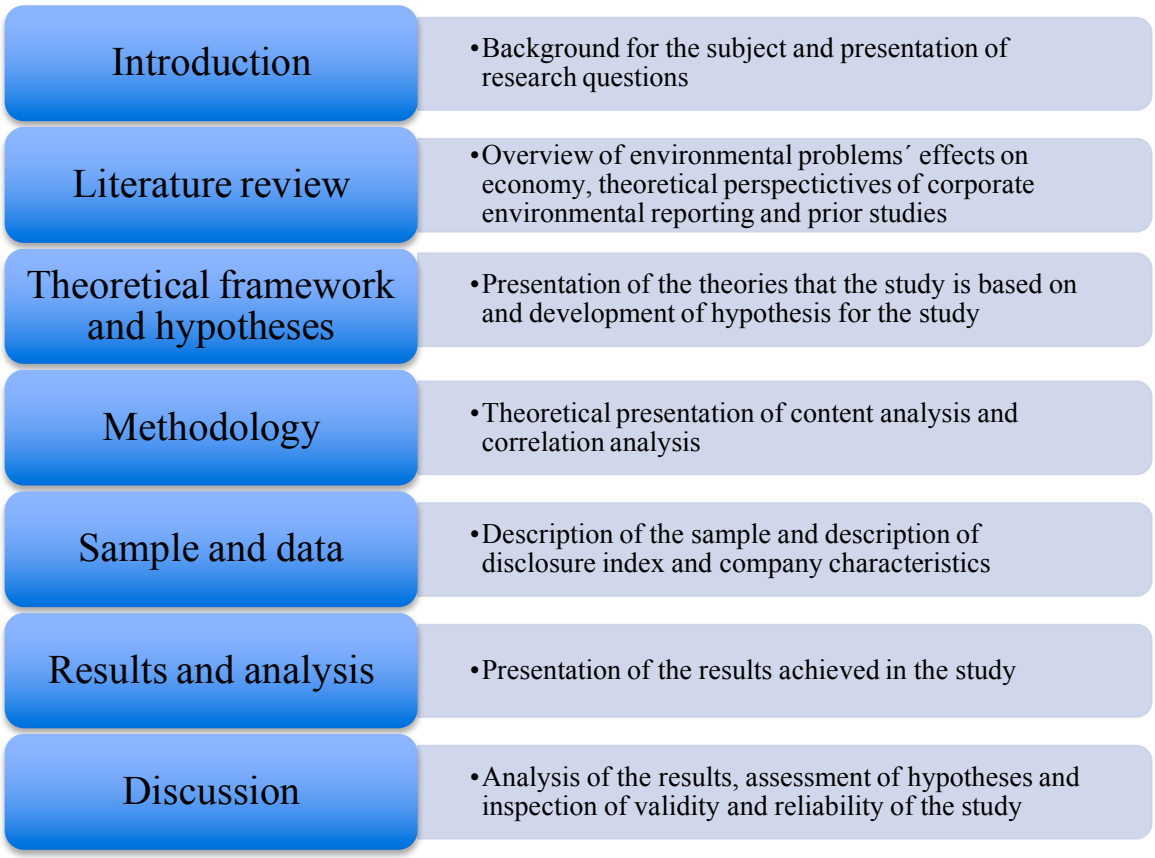

Figure 3. Structure of the thesis

2 Literature review

2.1 Environmental challenges and their impacts on business

The challenges and opportunities for businesses caused by environmental challenges such as climate change are wide-ranging. Environmental issues are creating tensions between economically profitable business and environmental sustainability as there is a growing hegemony demanding more taxes and regulation on businesses because they are believed to be one of the main sources of environmental problems (Huwart & Verdier 2013, 113). The current trend of global warming from pre-industrial levels is almost unanimously agreed among climate scientists to be the result of human activity (IPCC 2014, 5). The United Nation's Intergovernmental Panel on Climate Change has reported that the global average temperature is likely to have increased by 1.5 degrees Celsius from pre-industrial levels between 2030 and 2052 as consequence of human activities (Engelsen 2018, 6). The authors of the report argue that this level of global warming is likely to cause irreversible damage and increase climate-related risks to global economic growth.

Environmental problems are very topical subjects for business leaders and researchers because the competitiveness of companies on micro level and the economic development of different societies and global economic system on macro level are threatened by drastic environmental problems such as global warming. Simultaneously, global environmental problems are possibly creating enormous global markets and therefore creating substantial business opportunities for countries and enterprises which are capable to create solutions for these issues and utilize the opportunities (Wittneben, Okereke, Banerjee & Levy 2012, 6). Environmentally sustainable business models are potential sources of competitiveness and profit for companies in the modern era, and the global markets of renewable energy solutions are growing rapidly. Thus, corporate responses to these problems are not driven solely by environmental concerns, social pressure and regulations, but also by the pursuit of gaining competitiveness on markets

through environmentally sustainable solutions, products and services (Wittneben et al. 2012, 10).

2.1.1 Resource scarcity

Resource scarcity is exacerbated by climate change. Industries such as agriculture and forestry are affected by these immediate effects of environmental problems. Climate change is threatening the supply of raw-material and key commodities of many agricultural and forestry businesses. According to European Environment Agency (2015) the global demand for food is expected to grow by up to 70% in the coming decades, and simultaneously the global productivity of agriculture will continue to decrease because of environmental issues. Especially in Africa the decrease in agricultural productivity is going to be drastic as farming production is impaired by severely high temperatures which have become increasingly common in the African continent. Resource scarcity is a big threat to the businesses and employees who are dependent on them on many sectors. For example, drought does not affect agriculture alone, but also electricity production from hydropower and industries utilizing transportation on rivers. Extreme weather conditions such as drought, storms and floods are potentially imposing enormous costs and risks on construction and insurance businesses (Wittneben et al. 2012, 18). Also, ski resorts and tourism industry in northern areas and in ski resorts is directly affected by the increase in global temperatures as maintaining appropriate conditions for winter sports and arctic tourism becomes increasingly hard with the lack of snow (Seles, Jabbour, Jabbour, Fiorini, Mohd-Yusof & Thomé 2018, 764).

Water scarcity is often seen as a major challenge for the global economy. The problem is that usually water is a public-good, and thus water pollution and overuse remain unpriced (Hoekstra 2014, 319). Water scarcity is likely to be increasing in the future due to population growth and economic growth in Asian and African countries such as China and India. These trends are increasing the demand for animal production and biofuels, exacerbating water pollution, increasing costs of water supply and conflicts

over water resources (ibid., 318). In practice majority of companies are affected by water scarcity even if water was not a crucial resource in their business because of the interconnectedness of global economy. Supply chains of majority of transnational companies extend across the world. The water footprint of a multinational company's supply chain can be up to a hundred times the size of company's own water footprint (ibid., 319). Thus, it is extremely important that large companies assess the water usage of their supply chain partners. In the GRI standards this is taken in account in the indicators EN32 and EN33. These two indicators require information on actions taken on preventing and addressing the overall negative environmental impacts of the company's supply chain. Water usage assessment of supply chain is not therefore singled out in the GRI standards. Hoekstra (2014) argues that improvements in water use efficiency are likely to be offset by globally increasing production. According to Hoekstra (2014) private sector actors which are reliant on water supply are aware of the threat that water scarcity is causing for their business. Increasing number of transnational companies are taking heed of the problem by developing sustainable practices in their usage of water, reporting on their water consumption and re-use and by introducing new water saving technologies. More transparency on water consumption, pollution and re-use is demanded by many external stakeholders who are interested in companies' water usage. Especially transparency of relevant and tangible data on water usage is gaining increasing interest of the public and company stakeholders such as investors and customers (Hoekstra 2014, 319). Thus, it's interesting to see how extensively the companies included in this study are reporting on their water usage.

2.1.2 Extreme weather conditions

Extreme weather conditions and their consequences such as hurricanes, floods, extreme droughts and heat waves are having substantial negative and costly effects for the economy in many parts of the world. These extreme conditions are likely to increase in the future because of climate change (Jahn 2015, 30). In his article Jahn (2015) represented the costs that extreme weather conditions have caused on the economy of

the United States between 1980 and 2012. He included in the calculation only events of extreme weather which caused higher damages than 1 billion U.S. dollars. The average amount of yearly damages increased during the period under examination. In 2005, the damages caused by extreme weather conditions were approximately 190 billion U.S. dollars as result of the Hurricane Katrina. According to Jahn (2015) floods have been the costliest form of extreme weather events in Europe.

Droughts have increased significantly during the recent decades in Europe. Droughts are especially harmful for business sectors such as agriculture, food industries and power plants. (ibid., 33) As temperatures are increasing around the world as result of global warming heat waves are becoming more and more common, long and intense. Extreme heat is causing other economic impacts for example in the form of increased energy consumption for cooling (Jahn 2005, 34). These consequences of intensification and prolonging of heat waves are directly inflicting substantial costs for companies in many sectors. In practice the costs caused by extreme heat are indirectly incurred by all multinational companies as result of the heightened costs of supply chain partners. Interconnectedness of the global economy is spreading the negative consequences of environmental problems all around the world. Thus, also Finnish companies are affected by the problems even if they were not so urgent on their areas of operation.

Global warming is resulting in an increase of daily temperatures in many parts of the world. Extreme heat is substantially decreasing the productivity of millions of workers in many different sectors of economy. For example, farm and construction workers suffer from extreme heat, and thus their wellbeing and productivity decreases. Especially physical work which is mainly performed outdoors is strongly affected by heat waves, but productivity of labor is affected also in office environments and factories (Kjellstrom, Kovats, Lloyd, Holt & Tol 2009, 217). Effects caused by heat for workers are diminished work capacity, diminished mental task ability, increased number of mistakes and increased risk of work accidents (ibid., 2018). Kjellstrom et al. (2009) showed that global warming is causing significant reduction in labor productivity in many regions of the world. According to the authors labor productivity is decreasing especially in Middle-East and Africa as in these regions the heat caused

productivity losses will be up to 20% the regions' gross domestic product by 2080s (ibid., 224). Thus, either preventive measures need to be taken by organizations or more labor force will be required to achieve the same outputs.

2.1.3 Environmental regulation

The growing awareness on environmental issues and the public pressure are driving governments and intergovernmental organizations into establishing internationally binding strong regulations on businesses (Kleindorfer, Singhal & van Wassenhove 2005, 484). To avoid liability, companies need to comply with these environmental laws and regulations. This could be said to be the minimum level of effort that every company needs to take on environmental sustainability. Wittneben et al. (2012) argue that voluntary and market-based incentives on environmental sustainability alone are not strong enough to ensure that businesses act on environmentally sustainable way, and therefore regulation and economic control systems are needed. Governments are increasingly utilizing market mechanisms to influence environmental practices of companies. This means using economic mechanisms such as emissions trading as a tool of environmental policy implementation (Blair & Hitchcock 2004, 83). Market mechanism are preferred way of internalizing environmental costs by many economists because they are considered more neutral and thus less distorting for markets than direct regulation such as taxing.

International regulations such as the Kyoto Protocol are forcing companies to carbon regulation and investment in clean energy. Governments in most developed countries are also establishing substantial subsidy and tax credit systems for renewable energy systems and technologies, and simultaneously the estimated value of global fossil-fuel subsidies are decreasing (Shirai & Adam 2017). Policy makers have strong pressure to uphold policy flexibility in relation to environmental governance because flexibility allows to adjust the chosen policy direction when new information emerges or new kind economic or political situations occur. Sullivan (2008) lists a few possible factors that policy makers need to consider which are susceptible to change. For example, changes

in perceptions in relation to economy's impact on climate change, changes in costs of fuel and technology and changes in the structure of international environmental agreements which affect the relative competitiveness of different countries. For example, some countries may withdraw from interstate environmental treaties and this would result in the relative loss of competitiveness of the remaining countries' economies. New scientific information concerning climate change or new technologies may also require rapid changes in environmental politics and governance. Too fixed policy approaches to environmental governance would limit the possibilities of adapting to new kind of situations (Sullivan 2008, 32). Therefore, environmental governance is complex inherently prone to uncertainty and flexibility. For companies the flexible approach preferred by many governments is increasing uncertainty and creating additional costs.

The Paris agreement which was negotiated between 196 states and signed in the 2015 United Nations Climate Change Conference in 2015 has a goal to maintain the global warming below 2 degrees Celsius. The agreement requires a lot of actions from governments and organizations in the countries included in the treaty (Seles et al. 2017, 763). Governments are reacting to the to the requirements of international community and their societies. This is radically increasing the amount of environmentally protective regulation. As result of uncertainty in relation to future regulation companies are exposed to a greater level of risk in their investments decisions. Sullivan (2008) introduces some of the uncertainties which companies incur because of the increasing environmental regulation. For example, the level of national governments support for climate policy measures over the long terms varies after elections when the composition of government may change. The future competitiveness of certain investments and assets is uncertain as the level of regulation is not completely predictable let alone the specific policy measures. Commercial organizations thus need to prognosticate the possible directions of future environmental policies before making investment decisions (ibid., 32). The level of national governments' adherence to international and regional environmental agreements is not certain as is seen in the case of the Trump administration's withdrawal of the United States from the Paris agreement. For companies operating in multiple countries, like most of the Finnish companies included

in this study, are exposed to an additional regulatory uncertainty and complexity as there is vast differences in the implementation of environmental regulation between different countries. Sullivan (2008) suggests that the level of public subsidies for different technologies and the future price of greenhouse gas permits are also important matters for many companies. Uncertainty of environmental regulation is causing companies to delay their investments to a future moment when they'll have more information about regulation (ibid., 33). Thus, regulatory uncertainty is creating an additional risk premium for investments which might be exposed to environmental regulation and investments of companies are therefore decreasing.

2.1.4 Stakeholders' pressure and reputational risks

In addition to the immediate threats posed by environmental problems such as shortage of raw-materials, extreme weather conditions and increasing regulation, environmental challenges are potentially causing problems for the reputation of many multinational companies if they do not react to them. (Henderson, Reinert, Dekhtyar & Migdal 2018, 10).

While many politicians, citizens and business stakeholders hold the viewpoint that technological innovations produced by businesses under the pressure of competition will save the environment, Wittneben et al. (2012) point out that the global environmental issues are often perceived to a large extent be the consequence of different inherent features of capitalism such as consumerist culture, unsustainable production systems and business models and of the political power that business interests exert to maintain the current global economic system and the state of affairs. Thus, there are many different perceptions on the role of business on environmental challenges.

Climate change is strongly changing the business culture by raising environmental awareness and both internal and external stakeholders are more and more interested in the environmental effects of companies (Delmas & Pekovice, 2013). Consumers,

employees and investors are increasingly evaluating companies on their environmental sustainability and they are preferring those companies which they deem environmentally sustainable. This trend manifests itself for example in the form of consumers boycotting environmentally unsustainable companies. Failure to implement environmentally sustainable business practices and to report on them in a transparent way may result in a decreased trust of consumers (Blair & Hitchcock 2001, 45).

Consumer attitudes are influencing businesses and they have arguably strongly affected the magnitude and extensiveness of corporate policies heeding environmental concerns as consumers are increasingly knowledgeable about environmental problems such as global warming, o-zone depletion and animal extinction. The increased amount of information is affecting the consumption behavior of consumers and large share of them are willing to pay a premium price for environmentally sustainable products (Shao & Ünal 2019, 1474). Implementing environmentally sustainable practices and producing transparent reports on environmental impacts can also lower the reputational risks. As Delmas & Pekovice (2013) argue in their article companies which have concentrated on environmental problems and adopted sustainability in their strategies are also enjoying higher productivity of employees (Delmas & Pekovice 2013). Environmental sustainability is therefore increasingly important and thus, it must be embedded in the strategy of businesses as the awareness and societal discussion on environmental issues are increasing. Omitting these changing demands of society and corporate stakeholders may eventually lead to public pressure for governmental pressure for political intervention and decreased trust by investors, customer and employees.

2.2 Corporate social responsibility theories

The most widely applied following theories on CSR reporting are presented in this subsection: institutional theory, stakeholder theory, legitimacy theory, agency theory and neoliberal perspective on CSR. The prior studies presented in the next subsection are based on some these theories. Also, this study is applying some of these theories.

2.2.1 Institutional theory

Institutional theory was not widely applied to explain CSR and responsibility reporting prior to the 21st century (Brammer, Jackson, & Matten 2012, 4). Brammer et al. (2012) argue that most of the research on business responsibility has treated social responsibility as a body external demands. As a "black box", which can be transferred into business value. In the concurrent academic literature on CSR, institutional theory has often been used to explain the isomorphic tendencies of organizations and organizational institutions (Frynas & Stephens 2015, 489). The basic presumption of institutional theory is that organizations within a similar kind of institutional environment are prone to converge in terms or their organizational settings, practices and models. The institutional context of an organization, such as the national institutional context, strongly shapes and affects the organization through external pressure (ibid., 489). State regulation is the most prominent and obvious of the institutional aspects which affect CSR and CSR reporting (Campbell 2007, 954). National and regional business regulation directly affects CSR practices. Also, the ability to monitor the CSR practices such as environmental reporting greatly varies between different states as the funding and authority of civil servants and public authorities are dependent of the national context in which they exist (ibid., 954).

According to Frynas and Stephens (2015), the isomorphism of organizations manifests itself for example in the substantial differences in CSR practices and policies of commercial organizations in the institutional context of the EU compared with the institutional context of the USA (Frynas & Stephens 2015, 489). In his article, Campbell (2007) provides an example of the regulatory differences between Sweden and USA. In the 1960s and 1970s air pollution regulations were simultaneously developed and enacted in both countries, but with very different consequences on businesses. Whereas in Sweden company representatives were included in the policy negotiation process, in the USA the process was much more exclusive. Consequently, the regulations were deemed impractical by many American companies and they fought the implementation much more than Swedish companies. (Campbell 2007, 955) Regulatory institutions such as law and environmental regulation cause coercive

isomorphism. Also, membership in a stock exchange or association instill similar values and behavior models on companies. If majority of other companies in the same industry or stock exchange institution are applying certain behavior models such as GRI reporting, there is an institutional pressure to adopt similar models (Campbell 2007, 949 and Deegan 2002, 293) In addition to regulatory institutions normative and cultural institutions are also strongly affecting CSR. For example, the presence and leverage of non-governmental organizations, socially constructed structure of values and norms, public discourse on appropriate behavior of commercial organizations and organized dialogues between companies and their stakeholders affect the quality and extent of CSR reporting (ibid., 948). Thus, institutionalism provides an explanation for adherence to CSR as consequence of institutional coercive, normative and cultural pressure.

Institutional theory is a political CSR theory in the sense that it recognizes that companies are not only affected and shaped by their institutional environment, but they also actively seek to change the institutional arrangement. Institutional theory is system-oriented theory as one its key tenets is that the entity under examination is both influenced by and having influence upon the structure in which it operates (Deegan 2002, 292). Businesses are actively lobbying political decision makers to change regulation and regulatory structures which are addressing CSR. Thus, especially transnational companies are political actors and not solely passive adapters to their institutional environment (Frynas & Stephens 2015, 489)

2.2.2 Stakeholder theory

Stakeholder theory is studying the reasons why corporations address the interests of their different stakeholder groups such as investors, employees, customers, suppliers, shareholders, regulators and community representatives and align their actions, such as CSR disclosure accordingly (Campbell 2007, 949). The theory's connection with CSR disclosure is based on the notion that it is essential for companies to take care of their relationship with the mentioned stakeholder groups and that therefore CSR reporting as an essential strategic tool must consider the primal stakeholder groups (Fernandez-

Feijoo, Romero & Ruiz 2014, 55). The level, quality and extent of CSR disclosure are affected by the way in which the role of commercial organizations and their stakeholders are defined in a society (van der Laan Smith, Adhikari & Tondkar 2005, 123).

There are many academic studies conducted in cross-national context which show that the extent of corporate responsibility reporting is strongly affected by the companies' country of origin. The results from the study conducted by van der Laan Smith et al. (2005) indicates that companies which have their origins in countries with higher stakeholder orientation are providing responsibility reports with higher quality and wider extent than companies which originate from countries with prevalent shareholder orientation. (ibid., 143) As opposed to solely financial reporting, CSR reporting which is providing mainly non-financial information and concerning issues such as environmental and social impacts of a corporation is targeted also for other groups of stakeholders than just investors and shareholders.

Van der Laan Smith et al. (2005) argue that country of origin is an important factor in determining the extent of CSR disclosure of commercial organizations as countries with higher stakeholder orientation, such as the Nordic countries, have higher level of CSR disclosure than countries such as the USA with higher shareholder orientation. The orientation towards corporate stakeholders is therefore strongly affected by their institutional environment (Campbell 2007, 947). Cultural and institutional factors influence the relative of orientation of companies towards their different stakeholder groups. This affects the CSR reports which are produced by company executives. (van der Laan Smith et al. 2005, 129). Thus, the stakeholder orientation of companies and their contextual environment is affecting their CSR disclosure.

2.2.3 Legitimacy theory

When studying and examining the reasons and descriptions of why commercial organizations disclose environmental or social responsibility information or how they

should do it many researchers apply legitimacy theory (Deegan 2002, 288). The theory is based upon the postulation that for companies environmental and social reporting are a way of legitimizing their operations. Legitimacy theory postulates that corporations do need to legitimize their action because they do not have any inherent rights to exist or to operate in a way which has effects on environment, society, people, animals or resources (ibid., 292). Through law, rules and general acceptance society gives commercial organizations their right to operate and use resources. Societal legitimacy is a resource which is essential for the survival of companies as their existence depends on the consent of the society to allow them to legally exist and operate. Thus, commercial organizations need to align their actions and value systems with the values of the society in which they exist and operate to gain the position of legitimacy (ibid., 293).

O'Donovan (2002, 344) suggests that there exists a social contract between business and society which sets an obligation on companies to act in a socially acceptable and responsible manner. If there emerges a disparity between the actions of company and societal value systems the company's legitimacy is threatened. Legitimacy theory is based on the notion that organizations must participate in a legitimation process in which they try to alter the perceptions and values of society and environmental and social disclosure are central part of the legitimation process (ibid., 345). Thus, legitimacy is given by society to companies, but companies may control and have influence on the legitimacy. By CSR disclosures companies are informing their stakeholders and the public about their values and what they are doing.

Societal value systems are prone to change and the changes in societal values and norms are creating pressure for commercial organizations to participate in the legitimation process. Thus, legitimacy theory suggests that when companies are negatively associated with negative phenomena such as environmental issues they are prone to pursue congruence between societal values and corporate activity (O'Donovan 2002, 348). The results of the O'Donovan's study (2002) suggest that companies are likely to disclose even some environmental and social information to deflect the public's attention from the issue. Thus, legitimacy theory implies that companies disclose environmental information to create, restore or maintain their legitimacy.

2.2.4 Agency theory

Agency theory has been used by researchers in many different disciplines such as economics, finance, political science and sociology (Eisenhardt 1989, 57). In organizational research agency theory is discussing the relationships between principals who delegate work to agents. As different actors in an organization have diverging and often conflicting interests and motives there is a need for monitoring and enforcement of contracts (Calvo & Calvo 2018, 1223). The theory assumes that each actor within an organization is maximizing their own interests and thus making their decisions in accordance with their self-interests. Agency theory assumes that the level of a corporation's disclosure is determined by the anticipated costs and profits associated with the reporting activities. Voluntary disclosure is a way of reducing the information asymmetry, and thus agency theory indicates that firm size is positively associated with the level of CSR disclosure (Gallego-Álvarez & Quina-Custodio 2016, 220). The agency theory also suggests that profitability of a firm is positively associated with its level of disclosure. Gallego-Álvarez & Quina-Custodio (2016) argue that when the profitability of a company is high its executives have higher incentive to produce and publish information for different stakeholders to maintain good public image and stability which help them to maintain their position (ibid., 222).

There are the risks of moral hazard and adverse selection (Calvo & Calvo 2018, 1223). Friedman (1970) professes that the engagement of company executives in CSR activities is a form of agency problem. Friedman (1970) argued that as agents of shareholders, it is not morally acceptable fro company executives to engage in CSR activities as they would in this respect act as a principal, not an agent (Friedman 1970, 2). He argued that the resources spent in these activities are decreasing the overall welfare of society as the scarce resources would be spent in a suboptimal way because the only responsibility of commercial organizations is to maximize its shareholder value and social or environmental problems are to be addressed by governments (ibid., 2). Thus, in the view of Friedman (1970) companies are solely economic actors and political aspects of society are to be left to governments and other state actors.

2.2.5 Neoliberal perspective for corporate social responsibility

Businesses are not solely economic units of society, they are powerful actors in many aspects of society. Most of the theories explaining CSR address and emphasize moral, ethical and financial arguments. However, many researchers such as Milton Friedman (1970) has argued against the engagement in CSR activities with political and economic arguments. These researchers have often suggested that CSR has detrimental economic and political effects for society. (Weyzig 2009, 417) For example, Friedman (1970) argued that CSR activities are inherently undemocratic and have negative economic impacts (Friedman 1970, 2). By undemocratic Friedman (1970) means that as corporate executives are not elected through a democratic political process they cannot be authorized to pursue wider societal goals. He argues that welfare of society is maximized when company executives focus on making as much profits as possible, and that it's the task of government to align the goals of profit maximizing corporations the public interest (Weyzig 2009, 421).

According to some academics who are studying CSR, the argument is based on a neoliberal perspective which assumes that the profits which commercial company generates are a good indicator of its welfare generation (Weyzig 2009, 420 and Djelic & Etchanchu 2017, 642). The neoliberal perspective is strongly focusing on the legal compliance of business, and dismissing CSR activities which go beyond the legal obligations. As responsibilities to some of the corporate stakeholders are not based on contracts and thus cannot be understood as principal-agent relationships, a neoliberal perspective does not accept these responsibilities. The neoliberal perspective rejects CSR reporting altogether as it is not considered to increase the welfare of society or the company. (ibid., 421) Thus, in a neoliberal perspective the efforts to engage in CSR activities are considered both undemocratic and counterproductive.

Djelic and Etchanchu (2017) argue that globalization is strongly characterized by neoliberal ideology which is promoting the maximization of profits for shareholders and spreading of market mechanism. They suggest that CSR has evolved in accordance with

the basic tenets of neoliberal globalization as the voluntary character of CSR disclosure is based on the strict separation the spheres of public and private. The voluntary character of CSR reporting is advocated by neoliberalism as it gives more the authority and discretion to private enterprises instead of public domain.

Theory	Key tenets
Institutional theory	Organizations within a similar kind of institutional environment are prone to converge in terms or their organizational settings, practices and models. The institutional context of an organization, such as the national institutional context, strongly shapes and affects the organization through external pressure.
Stakeholder theory	Corporations address the interests of their different stakeholder groups such as investors, employees, customers, suppliers, shareholders, regulators and community representatives and align their actions, such as CSR disclosure accordingly.
Legitimacy theory	Societal legitimacy is a resource which is essential for the survival of companies as their existence depends on the consent of the society to allow them to legally exist and operate. Thus, commercial organizations need to align their actions and value systems with the values of the society in which they exist and operate to gain the position of legitimacy .
Agency theory	The theory assumes that each actor within an organization is maximizing their own interests and thus making their decisions in accordance with their self-interests. Agency theory assumes that the level of a corporation´s disclosure is determined by the anticipated costs and profits associated with the reporting activities.
Neoliberal CSR	Welfare of society is maximized when company executives focus on making as much profits as possible, and that it´s the task of government to align the goals of profit maximizing corporations the public interest. CSR disclosure should be completely voluntary.

Table 1. Essential theories on CSR disclosure

2.3 Prior research

This study is strongly based on earlier research. The methodology, theoretical framework and formulation of hypotheses in this study have been advised by prior studies. 12 of the most influential and essential earlier studies for this thesis are presented in this subsection. The selection of prior studies was based on their relevance for this study as they all are studying environmental reporting of relatively large organizations. They all include publicly listed companies in their samples. Most of the studies are conducted in the European context, because this facilitates their comparability with this study. The prior studies which referred or utilized GRI guidelines were selected because are comparable with this study. Some of the presented studies utilized a similar kind of methodology as this study. Also, these studies are influential for this study because most of them applied the socio-political theories on CRS reporting.

The studies cover a wide array of diverging methods, theories, samples and studied organizational characteristics. Thus, this subsection provides the reader a comprehensive view of relevant prior academic studies on the subject. Summaries of the 12 prior studies discussed in this section are presented in Table 1.

2.3.1 Theories used in earlier studies

Most of the prior studies presented in this section relied on some or all the three socio-political theories on CSR reporting: institutional theory, stakeholder theory and legitimacy theory. As Tavares & Dias suggest, these theories offer an extensive theoretical understanding for the research of social and environmental reporting (Tavares & Dias 2018, 52). Also, this subsection reveals that these theories can applied from different perspectives in different studies.

There's a wide variety of different theories which have been used in prior studies. In their study, Morhardt, Baird & Freeman (2002) referred to multiple different studies and theories which explain voluntary environmental reporting of organizations. The article refers to aspects of stakeholder theory, legitimacy theory and signaling theory. The article adduces the following eight reasons for environmental and social sustainability disclosure of commercial organizations: proactive anticipation of increasing regulation, environmental codes pertaining to a company's industry, cost reduction, fostering stakeholder relations, enhancing environmental visibility, perceived competitive advantage, enhancing legitimacy and adherence to societal norms (Morhardt et al. 2002, 215).

Yadava & Sinha (2016) base their theoretical framework on the study by Morhardt et al. (2002). They argue that urgent and pressing global environmental problems are increasing the awareness of different stakeholders such as regulators. This augments the pressure on corporations to establish environmental policies and programs. Thus, also Yadava & Sinha (2016) rely on stakeholder theory, legitimacy theory and signaling theory.

The study of Skouloudis, Evangelinos & Kourmousis (2009) relies on stakeholder theory. They argue that publicly available information on a company's environmental and social performance is extremely important for different stakeholder groups such as shareholders, investors, customer and employees. The study by Skouloudis et al. (2009) is also referring to the above-mentioned eight reasons for voluntary environmental disclosure presented by Morhardt et al. (2002).

Matuszak & Różańska (2017) and Dyduch & Krasodomska (2017) base the theoretical frameworks of their studies solely on legitimacy theory. Matuszak & Różańska (2017) emphasize the importance of converging to social values and expectations by means of voluntary disclosure. Legitimacy theory leads the authors to the hypothesis that the sample companies of their study will avoid disclosing information in GRI categories which could potentially affect their legitimacy in negative ways. Also, legitimacy theory helps the authors to hypothesize that the extent of voluntary sustainability disclosure is

affected by a company's industry membership. According to the authors legitimacy theory implies that companies in environmentally sensitive industries are prone to disclosure more environmental information than companies in environmentally non-sensitive industries. The study of Dyduch & Krasodomska (2017) aims at eliciting information on the elements that effect voluntary disclosure of the sample companies. Legitimacy theory helps the authors to develop their hypotheses pertaining to potentially important company characteristics for voluntary disclosure of social and environmental information.

The studies of Cappuyns, Vandenbulcke and Ceulemans (2015), Akbaş (2014) and Niskala & Pretes (1995) base their theoretical frameworks on the institutional settings of corporate environment. The studies explain social and environmental reporting of commercial organizations mainly with legal and normative pressure and international institutions such as the Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting (ISAR). The study of Cappuyns et al. (2015) also refers to the concept of a holistic approach on organizational responsibilities towards society. They argue that during the last few decades the general view of organizational responsibilities has diverged from the neoliberal approach which was proposed for example by Friedman (1970).

Gallego-Álvarez & Quina-Custodio (2016) rely on multi-theoretical framework. Their study was based on the three socio-political theories of stakeholder theory, legitimacy theory and institutional theory. The study explains differences in corporate environmental and social disclosure between different countries by using stakeholder theory. According to the authors the theory implies that companies originating from countries with stakeholder orientation provide more and higher quality information compared to companies originating from countries with shareholder orientation. Legitimacy theory helps the study to explain the increasing emphasis on social and environmental reporting among commercial organizations.

Both studies by Tarquinio, Raucci & Benedetti (2018) and Gallego-Álvarez & Quina-Custodio (2016) used institutional theory to explain sustainability reporting. In the

studies, institutional theory is used to hypothesize that the institutional context such as stock exchange, legal system, cultural framework or industrial environment affects voluntary disclosure of companies by the process of organizational isomorphism. The methodology is based on GRI standards in both studies. Tarquinio et al. (2018) suggest that GRI standards are an institutional aspect which affects voluntary disclosure, and this it can be used to explain the reporting practices of the sample companies.

The study of Gamerschlag, Möller & Verbeeten (2011) is based on political cost theory. The theory suggests that executives of organizations publish sustainability information to minimize and avoid costs pertaining to political decisions such as taxes, regulatory costs or punitive costs. Thus, Gamerschlag et al. (2011) argue that companies disclose environmental and social information mainly for economic reasons, and that they are constantly weighting the costs and benefits of CSR disclosure.

2.3.2 Research methods in earlier studies

All the presented studied applied content analysis in different ways. Many of the prior studies have utilized GRI guidelines in the measurement of the level of environmental disclosure.

The study of Morhardt et al. (2002) was one of the earliest academic studies which evaluated environmental transparency by using GRI indicators. They developed a scoring system which assigned points from 0 to 3 depending on the extent of published information on each indicator. The authors evaluated the extent of published information in the reports and assigned the points accordingly. For some of the indicators which they valued to be more important than others they assigned the maximum of 4 points. To measure differences in the extent of environmental disclosure between different industry sectors they applied t-tests of the means (Morhardt et al. 2002).

A similar method of content analysis and scoring system was applied by Yadava & Sinha (2016), Skouloudis et al. (2009), Matuszak & Różańska (2017), Dyduch & Krasodomska (2017) and Cappuyns et al. (2015). All these five studies applied content analysis to study sustainability reports, and they all assigned scores on the 30 environmental indicators of GRI Guidelines. Rating scale assigned points from 0 to 3 or 4 on each indicator. 0 points were assigned if no information on an indicator was provided, and from 1 to 4 points depending on the extent of published information. The method was based on the study by Morhardt et al. (2002). To minimize bias in scoring two researchers assigned the scores on each indicator independently. Yadava & Sinha (2016), Skouloudis et al. (2009), Matuszak & Różańska (2017), Dyduch & Krasodomska (2017) and Cappuyns et al. (2015) did not apply any statistical analysis as their objective was not to measure correlations between disclosure rates and different parameters. Thus, the studies were mainly descriptive by nature. All these four studies assigned equal weights for all indicators.

The research methodology of Gallego-Álvarez & Quina-Custodio (2016) was based on the GRI G3.1 reporting framework which included the total of 79 economic, environmental and social indicators. The study applied content analysis on the sustainability reports of the sample companies to evaluate the extent of published information on each GRI indicator. Based on the results of the content analysis a disclosure index was drawn up. Relations between disclosure index and company characteristics was tested by using a linear regression estimated by ordinary least squares. Similarly, Tarquinio et al. (2018) devised a disclosure index which was based GRI G3.1 standards. The authors downloaded GRI reports from the websites of the companies and performed a content analysis on the GRI reports to inspect the presence of indicators. The presence of information sought on an indicator was marked with “1”, and with “0” if the information was not found. Tarquinio et al. (2018) applied regression trees technique. Gallego-Álvarez & Quina-Custodio (2016) testes correlation by using linear regression model estimated by ordinary least squares. Both studies assigned equal weights for all indicators.

Niskala & Pretes (1995) applied content analysis to evaluate the reports containing environmental information. Their method applied yes/no answers to define environmental disclosures. The study did not apply any statistical analysis as their objective was not to measure correlations between disclosure rates and different parameters.

In addition to studies which evaluated transparency of disclosure by developing a disclosure index on basis of GRI standards, many studies have devised a disclosure index in other ways. A few studies have used number of words as unit of analysis. The studies of Akbaş (2014) and Gamerschlag et al. (2011) utilized content analysis to evaluate the extent of environmental disclosure of organizations. Number of words was used as the unit of analysis as the extent of environmental disclosure was measured by total number of words pertaining to environmental issues in the reports and websites of the companies under study. Gamerschlag et al. (2011) derived the used keywords from GRI standards. To evaluate the relationship between chosen company characteristics and environmental disclosure the studies by Akbaş (2014) and Gamerschlag et al. (2011) used ordinary least square regression analysis.

2.3.3 Data samples in earlier studies

The study of Morhardt et al. (2002) analyzed the environmental sustainability reports of 40 large and multinational companies from four different environmentally sensitive industry sectors. All the reports under study were released in 1999. They selected the largest companies in the world from four different industry sectors: “motor vehicles and parts”, “petroleum refining”, “utilities, gas and electric” and “electronics”. The sample included companies from many European and Asian countries and from the United States.

Yadava & Sinha (2016) studied sustainability reporting in Indian context. The study included only five organizations as in India only 11 reports were made in accordance with the GRI 2011 standards even though there were 721 719 registered companies in

India at the time of the study. The following three companies were governmental: Oil and Natural Gas Corporation (ONGC), Indian Oil Corporation Limited (IOCL), Steel Authority of India Limited (SAIL). To compare between governmental and private organizations, also Tata Steel and Reliance Industries were included in the study. The companies were from steel and oil industries. The companies were among the largest in India measured by turnover, net worth and profits.

The study of Skouloudis et al. (2009) analyzed sustainability reports of Greek companies from the year of 2005. The sample included only companies which had a country headquarter in Greece. Thus, multinational companies with subsidiaries in the country were excluded if they did not publish report at country level. The final sample included 16 companies.

The studies of Matuszak & Różańska (2017) and Dyduch & Krasodomska (2017) studied CSR reporting within Polish companies. Dyduch & Krasodomska (2017) studied CSR reports of publicly listed companies in Poland. The sample included 60 companies which were listed on the Warsaw Stock Exchange. They excluded financial companies and companies which had less than 500 employees. Matuszak & Różańska (2017) included a wider sample in their study. Their sample included 150 Polish companies which were listed on the Warsaw Stock Exchange on 3 August 2017. The companies included in the study represented 26 different industry sectors.

Cappuyns et al. (2015) analyzed economic and environmental sustainability disclosure of Belgian organizations. Their study included 27 large and internationally operating Belgian organizations which reported in accordance with GRI standards in 2013. Eleven organizations were defined to be from manufacturing industries and sixteen organizations were classified as service companies. As the sample was small Cappuyns et al. (2015) did not make further division into different industry sectors. The sample included companies of three different organization types: private, governmental and non-profit.

Gallego-Álvarez & Quina-Custodio (2016) studied the voluntary CSR disclosure of 110 companies for the year 2014, the latest year available. The sample included companies from five different countries: Spain, Portugal, France, United Kingdom and the United States and the companies were representing nine different industry categories. Their method was based on GRI standards. Thus, their study included only companies which reported in accordance with GRI standards in 2014.

Tarquinio et al. (2018) studied CSR reporting of Italian, Spanish and Greek companies. They performed the cross-country comparison by analyzing the extent of published GRI indicators. The final sample of the study included 134 companies: 24 listed on Athens Stock Exchange, 47 listed in Milan Stock Exchange and 63 listed in Madrid Stock Exchange. Al of the companies included in the study reported in accordance with GRI standards in 2012.

Akbaş (2014) studied the relationship between different company characteristics and environmental disclosure of Turkish companies which were listed in Borsa Istanbul 100 at the end of 2011. The sample of the study included the total of 62 companies from fifteen different industry sectors.

Niskala and Pretes (1995) analyzed environmental reports of Finnish companies in 1987 and 1992. Their sample included 75 Finnish companies from the following nine industries which were defined as environmentally sensitive industries: “chemicals and plastics”, “construction”, “energy production”, “electricity”, “forestry”, “industrial conglomerates”, “metals”, “oil” and “transportation”.

Gamerschlag et al. (2011) wanted to include companies with homogeneous institutional environment. Thus, their sample consisted of German companies. Germany was chosen because the country had no formal regulation on social or environmental disclosure of corporations. The study analyzed the annual sustainability reports of 130 largest publicly listed companies in Germany. The study analyzed the reports of the companies between 2005 and 2008, thus reports from 4 years were covered in the study.

2.3.4 Examined company characteristics in earlier studies

Many earlier studies hypothesized that some specific factors pertaining to company characteristics affect the level and quality of reported environmental information. The company characteristics examined in this study are based on the studies presented in this subsection.

Matuszak & Różańska (2017) examined how CSR disclosure differs between companies from different industry sectors. The study by Dyduch & Krasodomska (2017) also focused on Polish companies. The study examined relationship between the extent of disclosure and the seven following company characteristics: size, profitability, financial leverage, industry, duration of listing in the stock exchange, board size, share of women on the board, internationalization and reputation.

The aim of the study by Gallego-Álvarez & Quina-Custodio (2016) was to find out how extensively companies in different countries and with different company characteristics are reporting on their responsibility. For their study, Gallego-Álvarez & Quina-Custodio (2016) developed six hypotheses which were based on the relationship between different company characteristics and CSR disclosure indices which were measured by aggregating the number of published GRI indicators for each organization under study. Following company characteristics were used as independent variables in their study: company size, leverage, profitability, research & development (R&D) intensity which was used as a proxy for innovation, belonging to the Dow Jones Sustainability Index (DJSI) and the legal system of a company's country of origin (civil law versus common law). The studies by Tarquinio et al. (2018) and Akbaş (2014) included some of the same characteristics as Gallego-Álvarez & Quina-Custodio (2016). The company characteristics analyzed in the study by Tarquinio et al. (2018) were external assurance / non-assurance, country of origin, industrial sector, size measured by total assets, profitability measured by ROA and return on equity (ROE). The study by Akbaş (2014) studied the relationship between different company characteristics and environmental disclosure of Turkish companies which were listed in Borsa Istanbul 100. The analyzed

company characteristics were size, leverage, profitability, industry and age of a company.

Cappuyns et al. (2015) compared environmental disclosure between different organization types (private, governmental and non-profit) and type of supply (manufacturing and services). The study by Gamerschlag et al. (2011) studied the relationship between CSR disclosure and the following company characteristics: company visibility, shareholder structure, profitability, industry membership, company size and the company's relationship with its US stakeholders.

2.3.5 Findings of earlier studies

The results of the study by Morhardt et al. (2002) show that the companies in "motor vehicles and parts" sector achieved 27,2% of the total possible points in the GRI environmental report scores. The companies in "petroleum refining" sector achieved 13% of the total possible points. The companies "utilities, gas and electric" sectors had an average disclosure index of 10,9% and the companies in "electronics" sector achieved 17,2% of the total possible points in the GRI environmental report scores. Morhardt et al. (2002) concluded that the most significant result of the study was that the 40 largest companies in the world from environmentally sensitive industries achieved less than 20% of the total possible points in the GRI environmental report scores. The results demonstrate that there were substantial differences between consumer product sectors and commodity sectors. The disclosure rates for commodity sectors ("petroleum refining" and "utilities, gas and electric") achieved on average 11,95% of the total points whereas consumer product sectors ("motor vehicles and parts" and "electronics") achieved on average 22,2% of the total points.

The results of the study by Yadava & Sinha (2016) indicate that the companies under study did not report comprehensively on their environmental performance. The share of reported environmental indicators ranged from 51% to 80%. The companies reported most extensively on the environmental categories of "energy", "materials" and "water".

Yadava & Sinha (2016) inferred that these environmental categories are reported extensively because companies want to improve efficiency in the usage of energy, materials and water as they directly impact their variable costs. The authors called for governmental initiatives which could help Indian companies to understand the importance of biological diversity and the overall health of nature.

In the study by Skouloudis et al. (2009) on average the disclosure coverage of environmental GRI indicators was 13%. None of the companies under study achieved a disclosure percentage of 50%. Thus, in 2009 environmental reporting based on GRI standards was strikingly meagre among Greek companies. In less than 10 years this has improved substantially. The 24 Greek companies included in the sample of the study by Tarquinio et al. (2018) reported on average 21,3 out of 30 environmental GRI indicators (71%). The median was 25,5 disclosed environmental indicators among the Greek companies.

In addition to the Greek companies, the study by Tarquinio et al. (2018) also included Spanish and Italian companies. The findings of the study indicated that Spanish companies disclose environmental indicators more extensively than companies originating from Italy and Greece in all sectors of GRI G3.1 standards except "product responsibility". On average, Spanish, Italian and Greek companies disclosed 72% (median 22), 67% (median 21) and 71% (median 25,5) of the environmental GRI indicators respectively. Tarquinio et al. (2018) inferred that the significant conformability of disclosure between the three countries might be resulting from the socio-cultural and legal homogeneity of the countries. The conclusion is supported by the institutional theory. The most important company characteristics which were associated with higher environmental disclosure were external assurance of the reports and profitability (ROA). Also, larger company size positively affected the level of environmental disclosure.

Findings of the study by Gallego-Álvarez & Quina-Custodio (2016) indicated that company size was the variable which was most influential company characteristic for environmental disclosure. Larger companies disclosed environmental information more

extensively than smaller companies. Companies belonging to DJSI reported more extensively than non-DJSI companies. Also, companies originating from countries with civil law system (Spain, Portugal and France) had higher levels of environmental disclosure than companies originating from countries with common law system (United Kingdom and the United States). Gallego-Álvarez's & Quina-Custodio's (2016) study shows that the companies included in their study reported on average 64,93% of the environmental GRI indicators. As to indicator categories, the companies included in their sample published most environmental indicators which were related to greenhouse gas emissions and energy consumption.

The findings of study by Cappuyns et al. (2015) show that on average the Belgian organizations which were included in the study reported 11 out of 30 environmental GRI indicators. The study included companies of three distinct types or organization. Private organizations disclosed more environmental information than governmental and non-profit organizations. On average the manufacturing companies achieved higher share of the total possible points than the service companies. This result supports the postulate that organization from environmentally sensitive industries disclose more environmental information than organizations from non-sensitive industries.

The findings of study by Akbaş' study (2014) showed that company size correlated positively with the level of environmental disclosure among the sample companies. Also, there was a statistically significant relationship between industry membership and the level of environmental disclosure. The companies from environmentally sensitive industries disclosed more environmental information than the companies from environmentally non-sensitive industries. The other studied company characteristics did not have statistically significant correlation with the level of environmental disclosure.

The results of the study by Dyduch & Krasodomska (2017) found statistically significant positive correlation between environmental disclosure level and company size, environmentally sensitive industry membership, shorter duration of the stock exchange listing and share of foreign capital. Matuszak & Różańska (2017) found that of the studied Polish companies 33% disclosed either detailed or very detailed

information concerning their environmental performance. The findings of the study also showed that there was significant divergence between different industry sectors. Most of the companies from the industries of “basic materials”, “energy” and “oil & gas” disclosed information extensively.

The results of the study by Niskala and Pretes (1995) show an 80% increase in environmental disclosure of the sampled Finnish companies between 1987 and 1992. For example, in 1987 any of the 75 companies had not presented any information pertaining to recycling whereas in 1992 16% of the companies provided at least qualitative information on the subject. In 1992 48% of the companies disclosed at least some environmental information. Finnish companies from the environmentally sensitive industries provided mainly qualitative information on their environmental impacts, which is not as easily comparable as quantitative information. Niskala and Pretes (1995) showed Finnish companies are disclosing relatively little environmental information compared to companies originating from other European countries. Thus, it interesting to see if this study reaches similar conclusion or if the situation has changed in 25 years.

The findings of the study by Gamerschlag et al. (2011) indicate that there is a statistically significant positive relationship between profitability and environmental disclosure. Also, industry membership affected environmental disclosure. Companies from environmentally sensitive industry sectors such as construction and basic industries disclosed more environmental information than companies from environmentally non-sensitive industry sectors such as insurance and software services. Also, the results show that the amount of total assets affected environmental disclosure. The authors suggest, that this might be resulting from the fact that in general companies operating in environmentally sensitive industries have high total assets.

Study	Theories	Sample	Key findings
Morhardt, Baird & Freeman (2002). *Scoring corporate environmental and sustainability reports using GRI 2000, ISO 14031 and other criteria*	Stakeholder theory, legitimacy theory and signaling theory	Environmental sustainability reports of 40 largest industrial companies in the world	The 40 largest companies in the world from environmentally sensitive industries achieved less than 20% of the total possible points in the GRI environmental report scores.
Yadava, R. N., & Sinha, B. (2016). *Scoring sustainability reports using GRI 2011 guidelines for assessing environmental, economic, and social dimensions of leading public and private Indian companies*.	Stakeholder theory, legitimacy theory and signaling theory	Sustainability reports of five large industrial organizations in India.	The share of reported environmental indicators ranged from 51% to 80%. The companies reported most extensively on the environmental categories of "energy", "materials" and "water".
Skouloudis, Evangelinos & Kourmousis (2009).*Development of an evaluation methodology for triple bottom line reports using international standards on reporting.*	Stakeholder theory	Sustainability reports of 16 large and multinational Greek companies.	On average the disclosure coverage of environmental GRI indicators was 13%. None of the companies under study achieved a disclosure percentage of 50%.
Dyduch & Krasodomska (2017). *Determinants of corporate social responsibility disclosure: An empirical study of polish listed companies* .	Legitimacy theory	Annual reports of 60 Polish companies which were listed on the Warsaw Stock Exchange and employed more than 500 people.	Company size, industry membership, shorter duration of the stock exchange listing and higher foreign capital share correlated positively with the levels of environmental disclosure.
Matuszak & Różańska (2017).*CSR disclosure in polish-listed companies in the light of directive 2014/95/EU requirements: Empirical evidence.*	Legitimacy theory	CSR reports of 150 Polish companies which were listed on the Warsaw Stock Exchange.	Of the studied Polish companies 33% disclosed either detailed or very detailed information concerning their environmental performance.

Study	Theories	Sample	Key findings
Cappuyns, Vandenbulcke & Ceulemans (2015). *Economic and Environmental Performance Indicators in Belgian GRI Reports*	Institutional theory	Annual reports of 27 Belgian organizations which reported in accordance with GRI standards.	On average the Belgian organizations which were included in the study reported 11 out of 30 environmental indicators.
Gallego-Álvarez & Quina-Custodio (2015). *Disclosure of corporate social responsibility information and explanatory factors.*	Stakeholder theory, legitimacy theory and institutional theory	Reports of 110 companies from five different countries: Spain, Portugal, France, United Kingdom and the United States.	Size was the most influential company characteristic for environmental disclosure. Also, companies belonging to DJSI and companies originating from countries with civil law had higher levels of environmental disclosure.
Tarquinio, Raucci and Benedetti (2018). *An Investigation of Global Reporting Initiative Performance Indicators in Corporate Sustainability Reports: Greek, Italian and Spanish Evidence.*	Institutional theory	Annual reports of 134 companies: 24 listed on Athens Stock Exchange, 47 listed in Milan Stock Exchange and 63 listed in Madrid Stock Exchange	Spanish, Italian and Greek companies disclosed 72%, 67% and 71% of the environmental GRI indicators respectively.
Akbaş (2014).*Company Characteristics and Environmental Disclosure: An Empirical Investigation on Companies Listed on Borsa Istanbul 100 Index.*	Institutional theory	Annual reports of 62 publicly listed companies from fifteen different industry sectors.	Company size and membership in an environmentally sensitive industry correlated positively with level of environmental disclosure. Profitability correlated negatively with environmental disclosure.
Niskala & Pretes (1995). *Environmental reporting in Finland: a note on the use of annual reports.*	Institutional theory	Annual reports of 75 Finnish companies from nine different industries.	The results show an 80% increase in environmental disclosure of Finnish companies between 1987 and 1992. In 1992 48% of the companies disclosed at least some environmental information.
Gamerschlag, R., Möller, K., & Verbeeten, F. (2011). Determinants of voluntary CSR disclosure: Empirical evidence from Germany.	Political cost theory	Annual sustainability reports of 130 largest publicly listed companies in Germany.	There was a statistically significant positive relationship between profitability and environmental disclosure. Also, industry membership affected environmental disclosure.

Table 2. Prior studies

3 Theoretical framework and hypotheses

3.1 Theories used in the study

The theoretical framework for this study was developed and derived from the essential theories that the extant academic research on CSR has applied. The most widely applied theories explaining CSR were presented and discussed in the literature review in Section 2. Institutional theory, stakeholder theory, legitimacy theory, agency theory and neoliberal perspectives on CSR were discussed in the previous section. Three of these theories were chosen for theoretical framework of this study as they were evaluated to be the most suitable and appropriate theories for explaining environmental disclosure of commercial organizations. These three theories are the following socio-political theories: institutional theory, stakeholder theory, legitimacy theory. Rationale for the choice of the theories is explained and elaborated in this section.

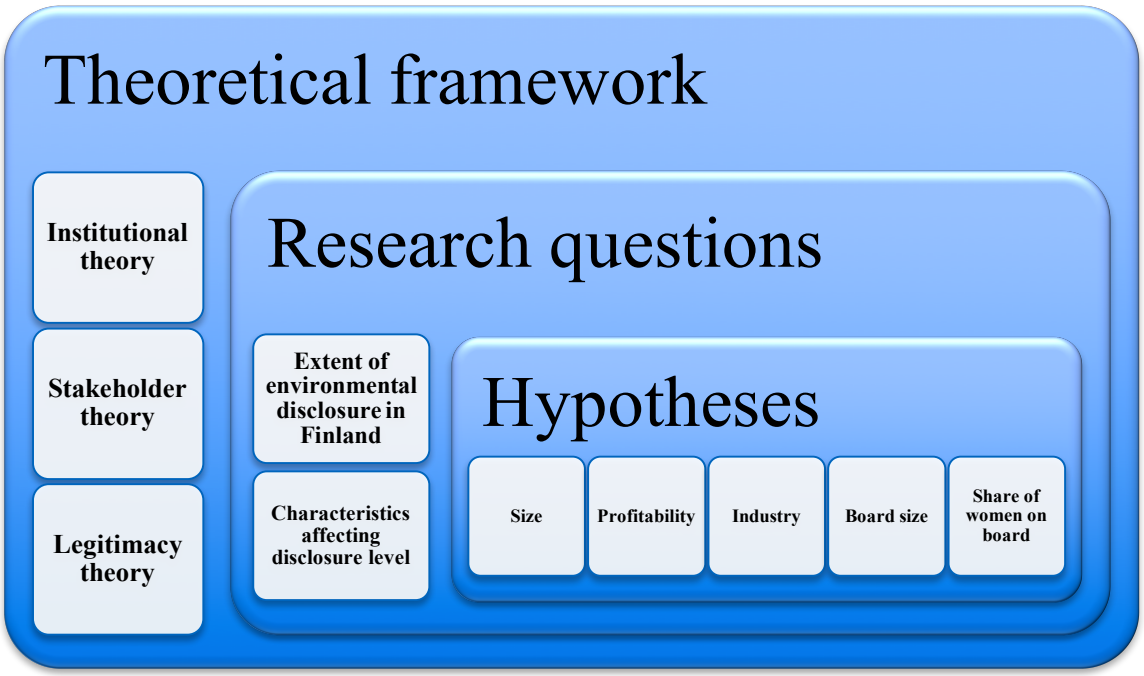

Figure 4. Framework of the study

Institutional theory suggests that commercial organizations are above all economic actors which are operating within a certain institutional environment which strongly affects them (Gallego-Álvarez & Quina-Custodio 2016, 221). Simultaneously corporations affect and transform their institutional context (Brammer et al. 2012, 6). Institutionalization means the pressures by which societal expectations and norms affect structure and behavior of organizations (Dacin 1997, 48).

Institutional theory explaining CSR implies that common institutional environment causes organizational isomorphism by imposing expectations and norms on organizations (Frynas & Stephens 2015, 489). Thus, according to the theory, organizations facing similar kind of environmental pressures are adapting homogeneous practices. This could ensue that organizations within the same industry sector would converge each other in the extent of their environmental reporting as the organizations are facing similar market expectations and institutional constraints. The organizations included in this this study are allocated in nine different industries. The results will show if there exist differences in the levels of environmental disclosure between different industry sectors.

Institutional theory on CSR helps to explain that the most fundamental institutions common to all the companies included in the study, such as national regulation of Finland or laws of the EU affect the environmental disclosure of the companies and impose expectations on them. For example, the Stock Exchange is an institution which is imposing certain rules, norms and expectations on the companies of this study. This implies that the organizations should converge each other by their practices such as social and environmental reporting. The theory suggests thy their practices at companies which have the same country of origin, Finland in the case of this study, converge each other in terms of their environmental reporting (Gallego-Álvarez & Quina-Custodio 2016, 221). The main purpose of this thesis is to find out how extensively publicly listed companies in Finland are reporting on their environmental practices and impacts. The results that will be achieved in this study concerning the levels of disclosure can be compared to other studies with similar research approach in other countries. For

example, in the case that there will be significant differences between the results obtained in this study and results studies conducted in other countries, it can be inferred that some of the institutional aspects related to Finnish business environment are at least partly causing these differences.

Also, as this study is based on GRI Guidelines it may be considered that reporting of the sample companies has been affected by the institutionalization of GRI. Tarquinio et al. (2018) suggest that GRI standards affect voluntary disclosure through normative, mimetic and coercive mechanisms. Therefore, institutional theory may help to explain reporting of the sample companies.

Stakeholder theory suggests that publicly reported information is a way of consolidating dialogue between companies and their various stakeholders such as suppliers, employees, regulators and customers (Campbell 2007, 949). The relationship between companies and their shareholders is affected by different company-specific characteristics. Companies operating in different industries have different stakeholders as they are selling their products for different markets and regulated by different authorities. It could be assumed that stakeholders in different industries have varying demands for environmental information. For example, the environmental effects of companies in energy industries are monitored more closely by regulators and media than companies in service industries. Also, for example size affects the relationship between company and its stakeholders (Tokoro 2007, 153). Presumably the bigger a company is the more diverse and large its shareholder structure is and this might affect the expectations and demands of the shareholders collectively.

According to stakeholder theory country of origin is significantly influencing the quality and extent of social and environmental disclosure of commercial organizations (van der Laan Smith 2005, 124). Different countries have varying factors which influence the relationship between companies and stakeholders. This study is in part based on stakeholder theory because the study is including companies from one country, Finland. If exist significant differences between the results of this study and prior or future

studies with similar approach in other countries, the differences might be partly explained with Finnish institutional structures.

Legitimacy theory suggests that companies disclose social and environmental information because they want to gain, maintain or repair their legitimacy (O'Donovan 2002, 346). Thus, companies utilize voluntary disclosure as a mechanism to pressure exerted on them by different the society. Gallego-Álvarez & Quina-Custodio (2016) argue that whereas stakeholder theory assumes that corporations disclose information mainly for different stakeholder groups, legitimacy theory assumes that information must address the society at large. Thus, according to the theory, the values system of a company must be congruent with the value system of the larger social system of which the company is part of (Matuszak & Różańska 2017, 4).

3.2 Hypotheses

There are five hypotheses in this study which examine the relationship between different company characteristics and level of environmental disclosure of the companies under study. The five hypotheses are developed with the help of existing academic literature on environmental CSR disclosure and different company characteristics (Gallego-Álvarez & Quina-Custodio 2016; Dyduch & Krasodomska 2017; Tarquinio et al. 2018). The used company characteristics are presented in Table 3., and further discussed in this subsection.

Company characteristic	Description	Hypothesis	Expected sign
Size	Company size is measured by total revenues generated in 2017	H1	+
Profitability	Return on assets (ROA) is used as a proxy for profitability	H2	+
Industry	The sample companies are divided into nine different industries. The definition of industries is done accordingly to Finnish Foundation for Share Promotion´s industry classification	H3	+/-
Board size	This study is examining the relationship between the companies´ environmental disclosure levels of 2017 and the size of supervisory boards as of 31 December 2017	H4	+
Share of women on the board	This study is examining the relationship between the companies´ environmental disclosure level of 2017 and the composition of supervisory boards as of 31 December 2017	H5	+

Table 3. Hypotheses of the study

3.2.1 Company size

Hypothesis number one is that there is a positive correlation between environmental disclosure and company size. Many studies in the existing academic literature suggest that firm size is significant factor in explaining the level of CSR disclosure as most of them have found a positive relation between the two variables (Gallego-Álvarez & Quina-Custodio 2016, 221; Akbaş 2014, 147).

There are multiple possible explanations for the positive relationships of company size and CSR disclosure. Legitimacy theory suggests that the bigger a company the more it significance and visibility which requires it to disclose more information on its impacts on society and nature (Akbaş 2014, 148). The processes of monitoring, measuring, gathering, storing and disclosing of information can cause a lot of costs. Thus, smaller companies may not have as much resources to invest in voluntary information disclosure as larger companies (ibid., 148).

Larger companies have greater financial needs, and thus they might be more prone to voluntarily disclose also other than financial information compared to smaller companies. Therefore, disclosure might be more beneficial for larger companies economically (Gallego-Álvarez & Quina-Custodio 2016, 221). Bigger companies usually require more sophisticated and complex information production and storing system than smaller companies. Sophisticated information management systems facilitate the processes of information aggregation, management and disclosure (ibid., 221). Also, Gallego-Álvarez & Quina-Custodio (2016) bring forth the suggestion that smaller companies may be afraid that extensive reporting could have adverse effects on their competitive position on market. Because of the greater societal significance of larger companies they have more stakeholders which are closely minoring the actions and requiring higher level of disclosure.

3.2.2 Profitability

As the second hypothesis, this study proposes that there is a positive relationship between the level of environmental disclosure and profitability of a company. According to Gallego-Álvarez & Quina-Custodio (2016) executives of profitable companies might be prone to voluntarily disclose more information to acquire or maintain good public image as this might help them to maintain their own position in the company. Accordingly, when profitability is low, executives might be tempted to disclose less information to hide losses or other information which could endanger their position within the company (ibid. 2016, 222). Companies with higher profitability are likely to receive more attention from different stakeholders, thus they might be prone to disclose CSR information more extensively than smaller companies. Also, companies which are more profitable might have more resources to invest into the potentially costly processes of aggregating, managing and disclosing information (Akbaş 2014, 149).

Existing studies have had diverge results on the relationship between profitability and CSR disclosure. Akbaş (2014) showed that there are multiple different studies conducted in various countries which have had totally different results on the relationship between profitability and CSR disclosure (Akbaş 2014, 149).

3.2.3 Industry membership

The third hypothesis of this thesis is that the level of companies' environmental disclosure is associated with their industry membership. Many previous studies have concluded that the industry of a company affects its extent of CSR disclosure. According to legitimacy theory, companies which are operating in industries with potentially higher detrimental effects on the environment are prone to disclose more environmental information (Matuszak & Różańska 2017, 4 and Akbaş 2014, 150). For example, the environmental effects of companies in energy industries are receiving

much more societal attention and monitoring from stakeholders than the effects of a service company. Thus, according to theory, the higher the potential of environmental effects of business, the more likely it is to disclose environmental information.

Most of the previous academic studies which have focused on the relationship between industry and extent of environmental disclosure have found out that companies which operate mainly in industries which are associated with adverse environmental effects disclose more information (Akbaş 2014, 150 and Dyduch & Krasodomska 2017, 8).

3.2.4 Board size

The fourth hypothesis of this study is that there is a positive relationship between board size and the level of environmental disclosure. The existing academic literature suggests that bigger board size facilitates organizations' information disclosure by increasing the variety of skills on the board. Thus, higher number of directors on the board of directors variegates the skills pertaining to different aspects of voluntary disclosure (Dyduch & Krasodomska 2017, 8). Also, larger board size could possibly ensue more active exchange of ideas pertaining to different aspects of disclosure. Thus, the result could be better collective understanding and appreciation of the different sectors CSR disclosure.

The results of previous studies which have examined the relationship between board size and environmental disclosure have been mixed as some of them have indicated positive relationship, some negative and have found no relationship at all between the two (ibid., 8).

3.2.5 Women on the board

The fifth hypothesis of this study is that there is a positive relationship between share of women on the board of directors and the level of environmental disclosure. Webb

(2004) presented in her study that the companies which were defined as socially responsible, had more women on their board than companies on average. Webb (2004) used a sample of 394 companies which were defined as socially responsible and compared the board structure of these companies with a matched sample of companies. The socially responsible companies consistently had a bigger share of women on their board of directors, and she suggested that relationship was significant. (Webb 2004, 268). It can be hypothesized that the social responsibility of companies affect their environmental disclosure also. In the existing academic literature, there's many studies which have indicated similar kind of results with the relationship between the share of women on board of directors and level of CSR disclosure. On the other hand, there's studies which have found no relationship between the share of women on board of directors and extent of CSR disclosure. (Dyduch & Krasodomska 2017, 9)

4 Methodology

4.1 Content analysis

The chosen research technique for analyzing the GRI reports of the companies under study is content analysis. Content analysis has been widely applied in prior studies of sustainability reporting. Studying disclosure indices is branch of content analysis, and the method is one the primary techniques for analyzing sustainability reporting of organizations (Quina-Custodio 2015, 225). The method enables quantifying information pertaining to sustainability disclosure (Tarquinio et al. 2018, 7).

The research method was chosen on the basis that content analysis is an effectively way to organize qualitative information and elicit meaning from qualitative sources as the method allows to analyze a vast amount of data in the responsibility reports in a consistent, reproducible and objective manner (Bengtsson 2016, 10). According to Hshieh (2005) all approaches of content analysis include the following seven stages: development of research question, sample collection, defining the applied categories, outlining of coding process, implementation of coding process, determining of reliability and finally analyzing the results.

Content analysis is a versatile method for analyzing textual material. Stemler (2001) suggests that content analysis allows researcher to make inferences from a large quantity of data, which can later be refuted or ratified by other researchers using also other methods of data collection. Content analysis has been often defined as a quantitative way of analyzing qualitative data (Hsieh & Shannon 2005, 1278). Content analysis can be defined as systematic and replicable way to categorize and refine qualitative information. It is important that the analysis is based on explicit rules which are defined in advance to assure transparency, reproducibility and objectivity of the research (Stemler 2001, 1). The GRI index provides the study with clear and replicable basis to conduct the content analysis on. Content analysis can be defined very broadly. Basically, any technique which aims at making deductions from different types of

textual materials in a systematic and objective way by identifying certain predetermined characteristic from a body of text. However, content analysis can also be utilized in analyzing material in different forms besides text, for example video material, open-ended survey questions and interviews can be interpreted with content analysis. (Hsieh & Shannon 2005, 1278; Stemler 2001, 1)

4.1.1 Different approaches of content analysis

Rather than being a unitary approach to qualitative research, content analysis comprises different kinds of methods. Hsieh & Shannon (2005) present three different and distinct approaches of content analysis. The first approach is "conventional content analysis" which aims at describing the phenomenon under study. This approach is usually adopted when there is only a very limited amount of academic literature and theories on the subject (Hsieh & Shannon 2005, 1279). At best, the result of conventional approach is development of new research model (ibid., 1281). Relevant existing theories are not defined prior to the methodological research, rather they are addressed in the discussion section after the methodological study is conducted (ibid., 1279). The researcher quests for relevant theories which could be compared with the results obtained in the study. In conventional content analysis, pre-existing categories are not used, but rather the purpose is to form the categories along with the research process as the meanings and implications of data is interpreted. Thus, the categorization is emerging through the research process. These emergent categories are then used to organize and allocate textual codes into meaningful and practical sections. Hsieh & Shannon (2005) argue that the conventional approach might be a good way to obtain unique and personal results which are based on data as the approach does not impose predetermined classifications on the used data. The argument is based on the notion that pre-existing classifications and categories could possibly steer the research process and thus affect its results also. The main challenge with the conventional approach might be that it could lead to inadequate understanding of the studied phenomenon's theoretical context.

The second approach of content analysis presented by Hsieh & Shannon (2005) is "directed approach" which aims at developing or validating an existing theory or theories on the studied phenomenon. This study falls into this category of content analysis approaches. The directed approach does utilize existing theories for example in the formulation of research questions unlike the conventional approach. Directed approach is utilizing prior studies by identifying predetermined variables as initial coding categories. This makes the directed approach more structured method. The results obtained by directed approach are evaluated and compared to prior research results and theories. According to Hsieh & Shannon (2005) the main challenge of directed approach is that predetermined theories and variables might result in a biased approach to data. This may produce results which are supportive rather than non-supportive of the applied theory.

The third approach is "summative" content analysis which is substantially different from the other two approaches. This approach is identifying certain words in text and it's focusing on counting the frequency of these words in the analyzed text (Hsieh & Shannon 2005, 1283). From the frequency of selected words a researcher is making interpretations of the meanings attached to these words. According to Hsieh & Shannon (2005) the summative approach is the most nonreactive and unbiased way of studying text through content analysis. The main challenge of the approach is that it possibly overlooks the broader meanings of the studied phenomenon. Thus, it is possible that the approach can't see the forest for the trees, so to speak.

4.2 Correlation analysis

This study is measuring the relationship between environmental disclosure and the company characteristics of size, profitability, board size and women's share on the board of directors by using correlation analysis. Correlations between variables can be measured by different correlation coefficients. According to Hauke and Kossowski (2011) the most common coefficients are Pearson's coefficient, Spearman's rank

correlation coefficient and Kendall rank correlation coefficient. This study is measuring the correlations by Spearman's coefficient because unlike Pearson's correlation coefficient it does not assume normality of variables or linear relationship between the variables.

Spearman's rank correlation coefficient is a nonparametric rank statistic measure of the relationship between two variables. It does not require assumptions about the frequency distribution of the variables or about linear relationship between the measured variables. Spearman's rank correlation coefficient can be defined as Pearson's coefficient on the data after converting it to ranks. (Hauke & Kossowski 2011, 89)

The relation between industry membership and environmental disclosure was tested by performing the Brown–Forsythe test on the Statistical Package for the Social Sciences (SPSS) software. The difference of the distribution of the disclosure index among industrial and non-industrial companies of the sample was tested by using the Kruskal–Wallis test in SPSS.

5 Sample and data

5.1 Sample description

All the companies listed in Helsinki Stock Exchange which released a sustainability report made in accordance with GRI reporting standards in 2017 are included in the study. The study did not limit the sample in regards with industry, company size, profitability or other parameters. There are total of 129 companies listed in the Helsinki Stock Exchange of which 53 companies released the GRI report in 2017 (Table 2). Thus, 41% of the companies listed in Helsinki Stock Exchange are included in the study. Only companies listed in the Helsinki Stock Exchange were chosen for the study because public stock exchange is an institution which affects corporation's ownership structure and governance and reporting systems (Christiansen and Koldertsova 2009, 1). Thus, this study includes companies which are affected by the same institutional environment, i.e. stock exchange. In this way, a workable and the widest possible study population in the Finnish context was created.

The study aims at examining and eliciting country-specific information on the extent of environmental disclosure and on the relationship between environmental disclosure and company characteristics. There have been similar kind of studies in different countries, for example the research of Gallego-Álvarez & Quina-Custodio (2016), but not with the same research design and methodology in the Finnish context. The main objective and scientific contribution of this thesis is to elicit information on the subject in the Finnish context. GRI is the most widely used sustainability reporting standard in the world, and clear majority of large companies are annually releasing a GRI sustainability report (GRI 2019). Only companies reporting in accordance with GRI standards were chosen because the standard framework makes the disclosure transparency of different companies easily comparable and reproducible.

Industry sector	Number of companies	Percentage
Basic industry	7	13,2 %
Finance	5	9,4 %
Consumer services	6	11,3 %
Consumer goods	11	20,8 %
Technology	3	5,7 %
Industrial products and services	16	30,2 %
Telecommunications services	3	5,7 %
Oil & gas	1	1,9 %
Services of general interest	1	1,9 %
Total	53	100,0 %

Table 4: Industry division of the sample

The 53 companies included in the study are divided into nine different industry sectors according to the Finnish Foundation for Share Promotion's (FFSP) industry classification. The industry categories are: "oil and gas", "basic industry", "industrial products and services", "consumer goods", "healthcare", "consumer services", "telecommunications services", "services of general interest", "finance" and "technology". Therefore, all nine industries of the FFSP's industry classification are presented in the study. Two of the industry categories include only one company. The industry sector "oil & gas" includes only Neste corporation and the industry sector "services of general interest" includes only Fortum.

Due to the relatively small number of companies included in the study, the companies were also categorized into industrial and non-industrial companies to see if there does exist differences in environmental disclosure level between these two wider categories. Most of the companies can be defined to be industrial companies. The category of industrial companies includes the following five sub-categories: "basic industry", "consumer goods", "industrial products and services", "oil & gas" and "technology". Therefore, the total of 38 companies can be classified as industrial companies. The second category, non-industrial companies includes the four following sub-categories: "consumer services", "finance", "services of general interest" and "telecommunications services". Thus, the total of 15 companies can be classified as non-industrial companies.

	Company	Industry sector	Revenue 2017 (m. €)	ROA (2017)
1	Ahlstrom-Munksjö	Basic industry	1960,00	2,75
2	Aktia Pankki	Finance	210,30	0,41
3	Alma Media	Consumer services	367,30	9,65
4	Altia	Consumer goods	359,00	4,59
5	Amer Sports	Consumer goods	2690,00	3,58
6	Apetit	Consumer goods	314,00	-0,39
7	Atria	Consumer goods	1440,00	2,84
8	Bittium	Technology	51,60	-2,25
9	Cargotec	Industrial products and services	3280,00	3,83
10	Caverion	Industrial products and services	2280,00	-1,87
11	Citycon	Finance	338,20	1,87
12	Cramo	Industrial products and services	729,50	7,05
13	DNA	Telecommunications services	886,10	7,59
14	Elisa	Telecommunications services	1790,00	13,04
15	Etteplan	Industrial products and services	214,80	7,94
16	Finnair	Consumer services	2570,00	5,87
17	Fiskars	Consumer goods	1190,00	9,05
18	Fortum	Services of general interest	4520,00	3,98
19	HKScan	Consumer goods	1810,00	-4,77
20	Huhtamäki	Industrial products and services	2990,00	6,59
21	Kemira	Basic industry	2490,00	2,94
22	Kesko	Consumer services	10680,00	5,77
23	KONE	Industrial products and services	8940,00	12,51
24	Konecranes	Industrial products and services	3140,00	6,34
25	Lassila & Tikanoja	Industrial products and services	712,10	5,91
26	Marimekko	Consumer goods	102,30	12,01
27	Martela	Consumer goods	109,50	-1,13
28	Metso	Industrial products and services	2710,00	3,10
29	Metsä group	Basic industry	5040,00	6,13
30	Neste	Oil & gas	13220,00	11,69
31	Nokia	Technology	23150,00	-3,64
32	Nokian Renkaat	Consumer goods	1570,00	11,79
33	Nordea	Finance	9469,00	0,80
34	Outokumpu	Basic industry	6360,00	6,66
35	Outotec	Industrial products and services	1140,00	0,15
36	Raisio	Consumer goods	306,80	-4,79
37	Ramirent	Industrial products and services	723,70	7,41
38	Saga Furs	Consumer goods	52,70	3,92
39	Sampo	Finance	6995,00	5,03
40	Sanoma	Consumer services	1430,00	-10,16
41	SSAB	Basic industry	1860,00	2,62
42	Stockmann	Consumer services	1006,00	-10,16
43	Stora Enso	Basic industry	10005,00	5,31
44	Technopolis	Finance	179,70	4,45
45	Telia Company	Telecommunications services	1300,00	4,16
46	Tieto	Technology	1540,00	9,39
47	Tikkurila	Industrial products and services	582,40	2,49
48	Tokmanni Group	Consumer services	796,50	5,69
49	UPM	Basic industry	10001,00	7,45
50	Vaisala	Industrial products and services	332,60	9,93
51	Valmet	Industrial products and services	3160,00	4,27
52	Wärtsilä	Industrial products and services	4920,00	6,85
53	YIT	Industrial products and services	1990,00	2,58

Table 5: Companies included in the research

5.2 Measurement of the environmental disclosure index

This research focuses on non-financial information of GRI reports' environmental parts fetched from the companies' websites, annual reports and sustainability reports. In this study, all the environmental GRI reports are from year 2017 which is the latest year available. Most of the companies published their GRI report enclosed into their sustainability report or into their annual reports. Only two of the sample companies published a detached GRI table on their website. Some of the reports were released in Finnish and some in English. Environmental indicators of the GRI reports are evaluated on the basis if the companies are disclosing the information wholly, partially or not disclosing information on an indicator at all. The disclosure index is based on the GRI reports' environmental sections as the percentage of disclosed information. Thus, the objective is to systemically go through the GRI reports of the 53 companies included in the research and to create a disclosure index to out the analysis. Creating a disclosure index from the indices of corporate reports one of the basic techniques for examining and analyzing the information reported by companies, and it can be suggested to be a functional way to evaluate information transparency (Gallego-Álvarez & Quina-Custodio 2016, 225).

5.2.1 Content analysis in practice

To evaluate and quantify the companies' environmental responsibility disclosure transparency a disclosure index was created. The studies made by Gallego-Álvarez & Quina-Custodio (2016), Tarquinio et al. (2018) and Cappuyns et al. (2015) were used as a reference to devise the environmental disclosure index for this study. Every company which reporting in accordance with the GRI standards are publishing a GRI index table. Information concerning an indicator may be found either from the companies' websites, annual reports or sustainability reports. First, the 34 environmental GRI indicators were listed in an Excel workbook (see Table 6) along with the specific requirements for each

indicator. Then the published GRI table for each company was opened separately. The content analysis for of the GRI reports was done manually. In the table, they give the following information on the indicators: the index number is indicated, the extent (fully, partly or missing) of published information on an index and the section where to find the information concerning the indicator in question. The specific section which was containing the information on specific indicator was then searched and analyzed by manually highlighting the information which responded to the information requirements of a specific indicator. If all the required information on an indicator were found in the section in which the company had indicated that it should be found from, "1" was marked in the Excel workbook on the cell indicating a specific indicator for a specific company. If a company published information on an indicator only partly they informed about it in the GRI table. In these cases, the specific section was searched and analyzed in a similar manner. And if it was confirmed that information on not fully fulfilling the requirements on the indicator, "0,5" was marked in the Excel workbook on the cell indicating a specific indicator for a specific company. In this way, the information required by each indicator was verified and an inventory was made of all the environmental indicators publishes by each company. All the indicator for each company are presented in Appendices at the end of this study.

5.2.2 GRI G4 environmental indicators

The items in the GRI G4 environmental standards includes 34 different indicators. The indicators are divided into 12 categories. The first category is "materials" including the indicators EN1 and EN2. These indicators concern the type and amount of materials that organizations used to manufacture and package their products and services (GRI 2016). EN1 requires the absolute weight or volume of used materials, whereas EN2 percentage of recycled materials. The second category is "energy" including five indicators from EN3 to EN7. Energy indicators require information about organization's consumption and management of energy. The third category is "water". It is including three indicators from EN8 to EN10. These indicators concern organization's water consumption, withdrawal and discharge to assess its impact on water resources. The

fourth category is “biodiversity” including four indicators: EN11, EN12, EN13 and EN14. The indicators on this category require information on organization’s impact on biological diversity, such as animal species and natural ecosystems. The fifth environmental category is “emissions”, which is including seven indicators from EN15 to EN21. The indicators require information on emissions into air. Types of different emissions are greenhouse gas, ozone-depleting substances, nitrogen oxides, sulfur oxides and other significant emissions into air. The sixth category is “effluents and waste”, it is including five indicators from EN22 to EN26. The indicators address spills of harmful substances, management of waste and water discharges. The seventh environmental category is “products and services”, which is including two indicators: EN27 and EN28. These indicators require information on the extent of impact mitigation of products and services and on reclaimed products and their packaging materials. The eighth environmental standard category is “environmental compliance” including only one indicator, EN29. The indicator requires information on possible breaches of environmental laws and regulations. The ninth category is “transport” including one indicator. The indicator requires information on the transporting employees and on the significant environmental impacts caused by the organization’s transporting activities. The tenth category includes one indicator which requires the absolute monetary value of total environmental protection expenditures and investments. The eleventh category is “supplier environmental assessment” which is including two indicators, EN32 and EN33. These two indicators require information on actions on preventing and addressing negative environmental impacts of their supply chain. The last category is “environmental grievance mechanisms” which is including one indicator, EN34. The final indicator requires information on the number of environmental grievances which were addressed through formal grievance mechanisms. When analyzing the reports of the companies included in the study, only the information given in the reports has been taken into consideration. Further examination such as the truthfulness of reported information or external assurance of the reports has not been considered.

5.2.3 Quantification of the items

Companies may freely choose which of the 34 environmental indicators they are disclosing. They may also disclose information on a specific indicator only partially. Therefore, companies have three different scopes in which they may choose to report on an indicator: fully, partly or not at all. This study quantifies the disclosed information and devises an index by dividing the disclosed information into three categories according to how extensively the indicators were covered: 1: presence of information sought on an indicator; 0,5: partial presence of information sought on an indicator and 0: absence or very scarce amount of information sought on an indicator. Even though organizations may also disclose information only partially, it should be noted that they seem to relatively rarely do so, but rather tend to report the indicators completely. There were 34 indicators analyzed for 53 companies, i.e. total of 1 802 indicators of which 46 were reported partially. Thus, only 2,55% of the indicators were reported partially and the rest were reported completely or alternatively not at all (appendix A).

5.2.4 Aggregation

The aggregate disclosure value for each company is converted into percentage simply by adding the disclosed indices together. Thus, an environmental disclosure index was formed. Therefore, the aggregate disclosure number for each company is between the minimum number of 0 and the maximum number of 34 which corresponds to a maximum environmental disclosure index of 100%. The index is used as a proxy for the extensiveness and transparency of environmental disclosure.

G4 Disclosure	*Disclosure Title*
Materials	
G4-EN1	Materials used by weight or volume
G4-EN2	Recycled input materials used
Energy	
G4-EN3	Energy consumption within the organization
G4-EN4	Energy consumption outside of the organization
G4-EN5	Energy intensity
G4-EN6	Reduction of energy consumption
G4-EN7	Reductions in energy requirements of products and services
Water	
G4-EN8	Water withdrawal by source
G4-EN9	Water sources significantly affected by withdrawal of water
G4-EN10	Water recycled and reused
Biodiversity	
G4-EN11	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas
G4-EN12	Significant impacts of activities, products, and services on biodiversity
G4-EN13	Habitats protected or restored
G4-EN14	IUCN Red List species and national conservation list species with habitats in areas affected by operations
Emissions	
G4-EN15	Direct greenhouse gas emissions (Scope 1)
G4-EN16	Indirect greenhouse gas emissions (Scope 2)
G4-EN17	Other indirect greenhouse gas emissions (Scope 3)
G4-EN18	Greenhouse gas emissions intensity
G4-EN19	Reduction of greenhouse gas emissions
G4-EN20	Emissions of ozone-depleting substances (ODS)
G4-EN21	Nitrogen oxides (NOX), sulfur oxides (SOX), and other significant air emissions
Effluents and Waste	
G4-EN22	Water discharge by quality and destination
G4-EN23	Waste by type and disposal method
G4-EN24	Significant spills
G4-EN25	Transport of hazardous waste
G4-EN26	Water bodies affected by water discharges and/or runoff
Products and Services	
G4-EN27	Extent of impact mitigation of environmental impacts of products and services
G4-EN28	Reclaimed products and their packaging materials
Environmental Compliance	
G4-EN29	Non-compliance with environmental laws and regulations
Transport	
G4-EN30	Significant environmental impacts of transporting products and other goods and materials for the organization's operations, and transporting members of the workforce
Overall expenditures	
G4-EN31	Total environmental protection expenditures and investments
Supplier Environmental Assessment	
G4-EN32	New suppliers that were screened using environmental criteria
G4-EN33	Negative environmental impacts in the supply chain and actions taken
Environmental grievance mechanisms	
G4-EN34	Number of grievances about environmental impacts filed, addressed, and resolved through formal grievance mechanisms

Table 6: GRI G4 environmental indicators

5.3 Measurement and classification of the company characteristics

This study is examining five different company characteristics' relation with environmental disclosure: firm size, profitability, industry, board size and share of women on board. The characteristics used in this study cover all three main categories that earlier literature presents as possible contributors to the extent of corporate social responsibility disclosure: financial characteristics, firm-specific characteristics and corporate governance characteristics (Dyduch & Krasodomska 2017, 6). The financial characteristics firm size and profitability are measured in the same way as Gallego-Álvarez & Quina-Custodio (2016) did in their research. Firm size is measured by total revenues generated in 2017. Revenues measure the size of a company in product markets. Annual revenues generated is one of the most common measures for company size in academic corporate finance research (Dang, Li & Yang 2018, 8). Information on the companies' revenues for the fiscal year 2017 are collected from their websites and annual financial reports. For the regression analysis company size was measured by natural logarithm of revenues generated in 2017. Return on assets (ROA) is used as a proxy for profitability. ROA shows how efficiently a company is using its assets to generate earnings. ROA is calculated by dividing annual net income with total assets. Information on ROA for the companies' fiscal year 2017 is retrieved from business information company Bureau van Dijk's business information database Orbis.

As a company-specific characteristic this study is using is industry membership. The sample companies are divided into nine different industries. The definition of industries is done accordingly to Finnish Foundation for Share Promotion's industry classification. The industry categories are: "oil and gas", "basic industry", "industrial products and services", "consumer goods", "healthcare", "consumer services", "telecommunications services", "services of general interest", "finance" and "technology". Due to the relatively small number of companies included in the study, the companies were also categorized into industrial and non-industrial companies to see if there does exist

differences in environmental disclosure level between these two wider categories. For the regression analysis industry membership is a dummy variable which is equal to 0 if the company belongs to the category of industrial companies, and 1 if the company belongs to the category of non-industrial companies.

In this study, the characteristics pertaining to corporate governance are the board size and share of women on the board. The information on board size and composition are hand-collected from the companies' annual reports and corporate governance statements of the year 2017. This study is examining the relationship between the companies' environmental disclosure level of 2017 and the composition of supervisory boards as of 31 December 2017.

This study is measuring the relations between the company characteristics and environmental disclosure by Spearman's coefficient because unlike Pearson's correlation coefficient it does not assume normality of variables or linear relationship between the variables. The Kolmogorov–Smirnov test was carried out on the SPSS Statistics software and the result showed that the variables were not normally distributed.

In addition to studying the correlation between the different company characteristics and environmental disclosure, a multivariate regression model is applied to estimate the correlations between the variables and environmental reporting.

6 Results and analysis

6.1 Extent of environmental disclosures of Finnish publicly listed companies

The first main research question of this study is "to what extent are publicly listed companies in Finland disclosing information on their environmental performance measured by GRI environmental indicators?". The studied companies' percentage of environmental disclosure was measured by the disclosure index presented in the "sample and data" section. Firstly, the number of disclosed indicators was retrieved from the companies' documents and websites and then divided by the total number of indicators which in GRI G4 standards is 34.

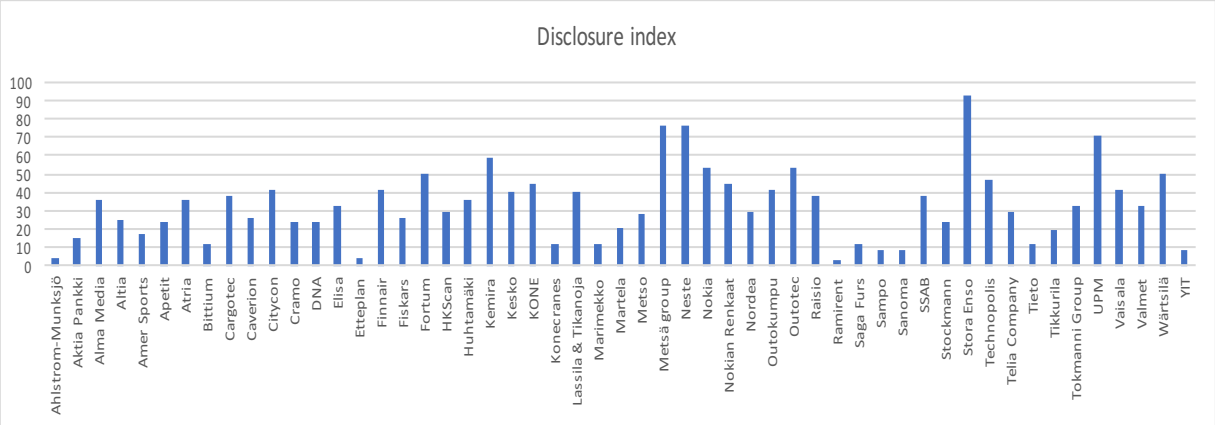

Figure 5. Disclosure indices of the companies under study

The results show that disclosure index had large variance. Stora Enso was the company which reported most extensively on the environmental indicators out of the companies included in the study by disclosing 31,5 out of the 34 indicators and thus its disclosure index was 92,65%. Stora Enso's disclosure index was the highest by a wide margin as the companies Metsä Group and Neste both disclosed 26 of the indicators, their disclosure index thus being 76,47%. It is noticeable that only four companies disclosed

at least 70% percent of the environmental information. Nine companies out of the 53 included in the study disclosed more than 50% of the environmental information. Ramirent had the smallest number of indicators reported with two partially reported indicators. Thus, its environmental disclosure index was 2,94%. The average number of reported environmental GRI indicators was 11,13. Therefore, on average the 53 companies included in this research reported 32,74% of the indicators. The median disclosure index was 32,35%. First quartile was 18,38% and third quartile was 41,18%. There were only four companies which disclosed more than two thirds of the 34 indicators. The standard deviation of disclosure rates was 19,48.

Minimum	First quartile	Median	Third quartile	Maximum	Standard deviation
2,94 %	18,38 %	32,35 %	41,18 %	92,65 %	19,48

Table 7. Quartiles of disclosure indices

6.1.1 Disclosure levels compared with earlier research conducted in other countries

Gallego-Álvarez & Quina-Custodio (2016) used a sample consisting of 110 companies from five countries (France, Portugal, Spain, United Kingdom and the United States) and industries. They used the information from 2014, the latest year available by the time. Since 2014 the GRI standards have been updated. The latest standard at the time was GRI G3.1 which had 30 environmental indicators, whereas the updated standard GRI G4 used in this study has 34 environmental indicators. Therefore, the disclosures levels measured in the study (ibid. 2016) and the levels measured in this study are not perfectly comparable. Gallego-Álvarez's & Quina-Custodio's (2016) study shows that the companies included in their study reported on average 64,93 percentages of the

environmental GRI indicators (ibid., 227). Finnish publicly listed companies which reported in accordance to GRI standards in 2017 disclosed significantly smaller percentage of the environmental indicators than the companies which were included in Gallego-Álvarez's & Quina-Custodio's (2016) study. Also, the standard deviations of environmental disclosure indices between the two studies differed. Gallego-Álvarez's & Quina-Custodio's (2016) study measured a standard deviation of 7,51 (Ibid., 226), whereas the standard deviation measured in this study was 19,47.

The findings of study by Cappuyns et al. (2015) show that on average the Belgian organizations which were included in the study reported 11 out of 30 (36,67%) environmental GRI indicators. The results are not perfectly comparable with this study because the study was based on the previous GRI G3.1 standards. Also, the study was conducted on the reports released in 2013. Thus, the extent of environmental disclosure of Belgian companies might have changed afterwards.

Tarquinio et al. (2018) conducted a cross-country comparison and analyzed GRI reports produced by companies in three different countries: Italy, Spain and Greece. Tarquinio et al. (2018) based their study on the GRI G3.1 standards. In the same manner as this study they included all the publicly listed companies from the three countries which released a sustainability report made in accordance to GRI standards. Their final sample included 47 Italian companies, 63 Spanish companies and 24 Greek companies. Tarquinio et al. (2018) found that the Italian, Spanish and Greek companies reported 67%, 72% and 71% respectively of the environmental GRI G3 and G3.1 indicators (2018, 9). Although the numbers are not perfectly comparable because of the update of GRI's environmental standards, the difference is substantial. Thus, it appears that Finnish public companies are disclosing relatively little amount of information on their environmental sustainability and performance compered to Italian, Spanish and Greek companies.

6.2 Disclosures of environmental indicators

Regarding the disclosure levels of different indicators among the companies under examination, EN3 was the most widely disclosed indicator with 92,45% of the organizations disclosing information concerning the indicator. The indicator's required information is the total energy consumption within the organization It is relatively easy for organizations to obtain the information concerning their internal energy consumption and companies are usually monitoring the information closely to track the costs caused by energy consumption.

EN1	46,23 %	EN18	59,43 %
EN2	29,25 %	EN19	46,23 %
EN3	92,45 %	EN20	5,66 %
EN4	17,92 %	EN21	35,85 %
EN5	60,38 %	EN22	26,42 %
EN6	51,89 %	EN23	72,64 %
EN7	18,87 %	EN24	32,08 %
EN8	58,49 %	EN25	6,60 %
EN9	9,43 %	EN26	7,55 %
EN10	10,38 %	EN27	14,15 %
EN11	16,98 %	EN28	9,43 %
EN12	13,21 %	EN29	52,83 %
EN13	10,38 %	EN30	6,60 %
EN14	4,72 %	EN31	3,77 %
EN15	82,08 %	EN32	39,62 %
EN16	79,25 %	EN33	23,58 %
EN17	59,43 %	EN34	9,43 %

Table 8. Disclosure rates of indicators (see Table 6. for descriptions of the indicatos)

The indicators concerning greenhouse gas emissions EN15 (direct greenhouse gas emissions) and EN16 (indirect greenhouse gas emissions) were the most disclosed environmental indicators after EN3. Disclosure coverages for EN15 and EN16 were

82,08% and 79,25% respectively. Other indicators concerning emissions were not disclosed as widely. For example, EN19 (reduction of greenhouse gas emissions) had a disclosure coverage of 46,23% even though it would be relatively easily reportable for companies which are tracking their emissions.

EN23 (waste by type and disposal method) had a disclosure coverage of 72,64%. Other indicators concerning effluents and waste were not disclosed as extensively. EN22 (water discharge by quality and destination) had a disclosure coverage of 26,42% and EN24 (significant spills) a bit higher coverage of 32,08%. The two remaining indicators concerning effluents and waste EN25 (transport of hazardous waste) and EN26 (water bodies affected by water discharges and/or runoff) had a much lower disclosure coverage of 6,60% and 7,55% respectively.

The indicators concerning biodiversity were not reported extensively by having an average disclosure coverage of only 11,32%. The biodiversity indictors EN11 (Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas), EN12 (significant impacts of activities, products, and services on biodiversity), EN13 (habitats protected or restored) and EN14 (IUCN Red List species and national conservation list species with habitats in areas affected by operations) had disclosure rates of 16,98%, 13,21%, 10,38% and 4,72% respectively.

The indicators concerning supply chain's environmental assessment EN32 (new suppliers that were screened using environmental criteria) and EN33 (negative environmental impacts in the supply chain and actions taken) had a disclosure coverages of 39,62% and 23,58% respectively. The difference in disclosure coverages between the two indicators concerning supply chain is significant. EN32 is relatively is relatively simple to track and report compared to EN33.

Materials	37,74 %
Energy	48,30 %
Water	26,10 %
Biodiversity	11,32 %
Emissions	52,56 %
Effluents and Waste	29,06 %
Products and Services	11,79 %
Environmental Compliance	52,83 %
Transport	6,60 %
Overall expenditures	3,77 %
Supplier Environmental Assessment	31,60 %
Environmental Grievance Mechanisms	9,43 %

Table 9. Disclosure rates of categories

The most extensively reported sector was "environmental compliance" with disclosure rate of 52,83% closely followed by "emissions" with disclosure rate of 52,56%. The environmental responsibility sector "energy" had the third highest disclosure rate of 48,30%. The "materials" sector had a disclosure rate of 37,74% and "supplier environmental assessment" had a coverage of 31,60%. The environmental reporting sector "effluents and waste" was the next most covered component with a disclosure coverage of 29,06% closely followed by "water" which had a coverage of 26,06 %. Much lower percentage of firms disclosed information on the remaining five sectors. "Products and services" had a disclosure rate of 11,79%, "biodiversity" 11,32%, "environmental grievance mechanisms" 9,43%, "transport" 6,60% and "overall expenditures" 3,77%.

6.3 Company characteristics and levels of environmental disclosure

To study the relationship between the five different company characteristics chosen for this study, the relationship between environmental disclosure level and the different characteristics were studied by separately measuring Spearman's rank correlation coefficient between each variable and the environmental disclosure index. The five characteristics used in this study were size, profitability, industry membership, board

size and share of women on the board. Also, a multivariate regression model was applied to test the correlations.

6.3.1 Company size and environmental disclosure

The first company characteristic analyzed in this study was company size. In this study company size was measured by total revenues generated in the fiscal year 2017. There was a positive correlation between level of environmental disclosure and company size. The Spearman's rank order correlation coefficient between company size and environmental disclosure index was positive (p=0,0006). Thus, the positive correlation between size and extent of environmental disclosure had a very high statistical significance.

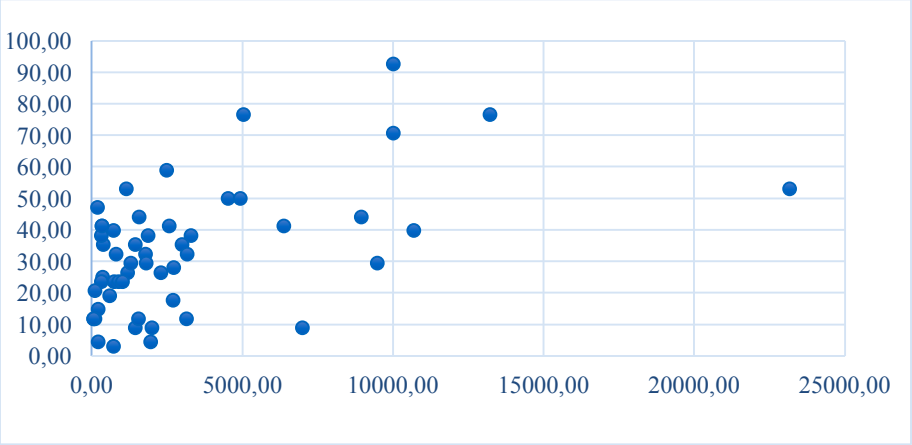

Figure 6. Scatter plot for size and environmental disclosure

The first hypothesis of the study was that "company size and environmental disclosure are positively correlated". The H1 is supported due to the result which indicates a statistically significant correlation.

6.3.2 Profitability and environmental disclosure

The second company characteristic used in this study was profitability. In this study, profitability was measured by the ratio of return on assets generated in the fiscal year 2017. The Spearman's rank order correlation coefficient of was not statistically significant (p=0,262).

The second hypothesis of the study was that "profitability and environmental disclosure are positively correlated". The H2 is not supported because the result indicates that there is not statistically significant correlation between the two variables.

6.3.3 Industry membership and environmental disclosure

The third company characteristic under study was industry membership of the companies included in the study. The 53 companies included in the study were divided into nine different industry categories. The median disclosure indices of the different industry categories are presented in the figure 7.

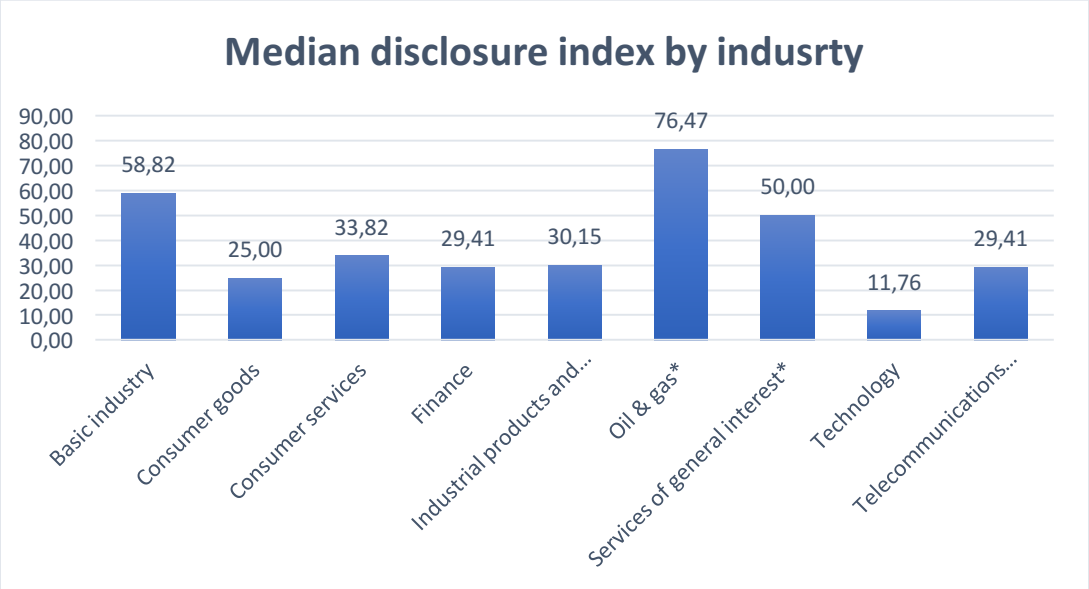

*Figure 7. Median disclosure index by industry (*includes only one company)*

The companies included in the basic industry sector had a median disclosure index of 58,82%. There were seven companies included in the sector. It was the only industry category including more than five companies which had a higher median environmental disclosure index than 50%. The industry categories "oil & gas" and "services of general interest both" included only one company, so inferences cannot be made from these two industry categories in this study. The industry category "consumer goods" included eleven companies and those companies had a median disclosure index of 25%. The industry category of "consumer services" included six companies and had a median disclosure index of 33,82%. The industry category of "finance" included five companies and had a median disclosure index of 29,41%. The industry category of "industrial products and services" was the biggest category of the study. It included sixteen companies and had a median disclosure index of 30,15%. "Technology" was the industry category with the lowest median disclosure index of 11,76%. The category included only three companies: Nokia, Bittium and Tieto which had disclosure indices of 52,94%, 11,76% and 11,76 respectively. "Telecommunications services" included three companies; DNA, Elisa and Telia. The industry sector had a median disclosure index of 29,41%.

	N	Mean	Std. Deviation
Basic industry	7	54,62	29,34
Consumer goods	11	25,80	10,42
Consumer services	6	30,15	12,19
Finance	5	28,24	16,45
Industrial products and services	16	28,68	15,84
Oil & gas	1	76,47	
Services of general interest	1	50	
Technology	3	25,49	23,77
Telecommunications services	3	28,43	4,49
Total	53	32,74	19,48

Table 10. Means of diclosure index and standard deviation by industry

The Brown–Forsythe test was used to determine if there are any significant differences in disclosure indices between different industrial categories. The industry categories "oil & gas" and "services of general interest" were excluded from the test because both these categories included only one company. The results of the test show that there were not significant differences in the extent of environmental disclosure between the industry categories (p=0,1163).

Due to the relatively small number of companies included in the study, the companies were also categorized into two groups: industrial and non-industrial companies. The category of industrial companies included the following five sub-categories: "basic industry", "consumer goods", "industrial products and services", "oil & gas" and "technology". Therefore, the total of 38 companies were classified as industrial companies. The average disclosure index for industrial companies was 33,63%. The first quartile of the sector's disclosure index was 18,01%, the median 29,41%, the third quartile 43,38% and the maximum was 92,65%. The second category, non-industrial companies included the four following sub-categories: consumer services, finance, services of general interest and telecommunications services. The total of 15 companies were classified as non-industrial companies. The average disclosure index for non-industrial companies was 30,49%. The first quartile of the sector's disclosure index was 23,53%, the median 30,88%, the third quartile 40,44% and the maximum was 50,00%. The Kruskal-Wallis was run on SPSS to test whether there exists statistically significant difference of disclosure between the groups of industrial and non-industrial companies. The results show that there was not statistically significant difference between the two groups.

The third hypothesis of the study was "the level of companies' environmental disclosure is associated with their industry membership". To test the hypothesis the Brown–Forsythe test was performed to compare the extent of environmental disclosure between different industry groups. There was a significant effect of industry membership on environmental disclosure (p>0,05). Thus, the H3 is not supported.

6.3.4 Board size and environmental disclosure

The fourth company characteristic used in this study was board size. The information on board size and composition are hand-collected from the companies' annual reports and corporate governance statements of the year 2017. This study is examining the relationship between the companies' environmental disclosure level of 2017 and the composition of supervisory boards as of 31 December 2017.

There was no significant correlation between the level of environmental disclosure and board size ($p>0,05$). The fourth hypothesis of the study was that "board size and environmental disclosure are positively correlated". The H4 is not supported because the result indicates that there is not statistically significant correlation between the two variables.

6.3.5 Share of women on board and environmental disclosure

The fifth characteristic used in this study was women's share on board of directors. This study is examining the relationship between the companies' environmental disclosure level of 2017 and the composition of supervisory boards as of 31 December 2017.

There was no significant correlation between the level of environmental disclosure and the share of women on the board of directors ($p>0,05$). The fifth hypothesis of the study was that "share of women on the board of directors and environmental disclosure are positively correlated". The H5 is not supported because the result indicates that there was not statistically significant correlation between the two variables.

6.3.6 Results of regression analysis

The results of Pearson correlation analysis show that the highest and the only statistically significant correlation coefficient ($p<0,01$) between the independent variables is 0,39 for company size and board size. This level of correlation between independent variables is not to be considered harmful (Akbaş 2014, 155). Thus, there was no unacceptable level of multicollinearity.

The results of regression analysis are presented in Table 11. F-statistic is 3,541 ($p=0,0008$). This shows that the model is statistically significant. Adjusted R square is 0,196. Thus, the examined variables explain 19,6% of the variability of the extent of environmental disclosure of the sample companies.

	Coefficient	t	Sig.
(Constant)		-0,684	0,497
Industry sector	-0,043	-0,335	0,739
Profitability	0,116	0,889	0,379
Board size	-0,034	-0,242	0,809
Size	0,499	3,602	0,001
Share of women	-0,050	-0,392	0,697
Adjusted R Square 0,196 F 3,541 p=0,008			

Table 11. Regression results

The results show that company size, which was measured by natural logarithm of revenues generated in 2017, has a statistically significant positive relationship with the extent of environmental disclosure ($p=0,001$). According to the results, the coefficients for the four other company characteristics, industry sector, profitability, board size and share of women on board are not statistically significant. Thus, the results of regression analysis confirmed the results obtained from correlation analysis.

7 Discussion

7.1 Conclusions

The main purpose of this study was to enhance understanding on the concurrent state of environmental sustainability reporting of Finnish companies. The subject was chosen because environmental sustainability has strongly come into the focus of concurrent discussion and research on corporate sustainability. Also, companies are increasingly directed towards more transparent corporate social responsibility reporting by public regulation. For example, the recently enacted EU directive 2014/95/EU on disclosure of non-financial information. It aims at increasing environmental transparency and sustainability of commercial organizations. The directive requires large organizations to disclose social and environmental information, and therefore it is now required also by the law in all EU countries to disclose certain environmental information to the public and authorities.

The study was carried out by analyzing the environmental GRI indicator disclosures of publicly listed companies in Helsinki Stock Exchange. All the companies which published a sustainability report made in accordance with the GRI standards were included in the study. Thus, the sample of this thesis includes 53 companies from nine different industries.

The aim was to increase understanding on how extensively the companies included in the research are communicating on the effects that their operations are causing to the environment and their actions on environmental issues, and to compare the results with different company characteristics which in this research were the companies' industry, size, profitability, board size and share of women on the board of directors. There are total of 129 companies listed in the Helsinki Stock Exchange of which 53 companies released the GRI report in 2017. Thus, 41% of the companies listed in Helsinki Stock Exchange are included in the study. To evaluate and quantify the environmental

responsibility disclosure transparency, a disclosure index was created for each company by examining the share of disclosed GRI indices.

The first research question of this thesis was "To what extent are publicly listed companies in Finland disclosing information on their environmental performance measured by GRI environmental indicators?". Findings of the study suggest that Finnish publicly listed companies are disclosing relatively little amount of information on their environmental sustainability and performance compared with the results of prior studies conducted in other countries. On average the companies included in this study disclosed 32,7 % of the environmental GRI indicators, and the standard deviation was 19,47 %. The results were compared with similar studies made in other countries. For example, the study by Tarquinio et al. (2018) showed that the Italian, Spanish and Greek companies reported 67 %, 72 % and 71 % respectively of the environmental GRI G3 and G3.1 indicators (2018, 9). These results are not directly comparable with this study as the GRI guidelines have been updated. The GRI G3 and G3.1 included 30 environmental indicators whereas GRI G4 guidelines used in this study include 34 environmental indicators. Gallego-Álvarez's & Quina-Custodio's (2015) study shows that the companies included in their study reported on average 64,93 percentages of the environmental GRI indicators with standard deviation of 7,51.

In the 1990s Niskala and Pretes (1995) showed that Finnish companies were disclosing relatively little environmental information compared to companies originating from other European countries. The results of this study indicate that the companies under study lack in reporting on environmental performance. Thus, it is concluded that Finnish publicly listed companies are still behind of companies in many other European countries in this issue, and the concept of environmental reporting needs to be addressed more comprehensively. Finnish companies need to improve their reporting on environmental performance based on GRI standards.

The second research question of this study was "Do some company characteristics affect the scope of environmental disclosure?". The five characteristics used in this study were size, profitability, industry membership, board size and share of women on

the board of directors. To study this research question five hypotheses were developed. Only the first hypothesis "there is a positive relationship between environmental disclosure and company size" was supported.

7.2 Critical reflection

This study has several limitations in its design and methodology which may have impacted the results and interpretation of the results. This sub-section discusses the limitations, reliability and validity of the research. Limitations section is included because it is important to acknowledge and present the limitations and weaknesses of the study. This helps to place the study in the context of existing literature on the subject and to increase its credibility (Brutus, Aguinis & Wassmer 2013, 49).

7.2.1 Limitations

This study has empirically examined the extent of environmental GRI disclosures of publicly listed companies in Finland. The sample is relatively small as it includes only 53 companies from 9 different industries. Due to the small sample size, some of the industry categories include only small number of companies. Also, the sample includes only publicly listed companies from one country. The companies are relatively large, and thus, the results may not be generalized for all publicly listed companies. The limited sample of 53 organizations limits the generalizability of the findings to all Finnish organizations.

The study is focusing on the environmental reporting of the companies from one year only. Thus, only the GRI reports from 2017 were analyzed. This may affect the results as longer period of study on the same sample of companies might have produced different kinds of results. The company characteristics of size and profitability were measured by total revenues generated in 2017 and by ROA of 2017 respectively.

Including more variables could have possibly enabled more accurate evaluation on the size and profitability of the sample companies.

The subject of the thesis was studied by conducting content analysis on GRI reports. Focusing on GRI indicators makes the study easily comparable with prior studies, but on the other hand it limits the available data as it was not possible to include companies which did not publish GRI report. Thus, some other methodology could have enabled collecting a larger sample, but the comparability would possibly not have been as accurate as in this study.

7.2.2 Reliability

Reliability means the consistency and reproducibility of the chosen method of measurement. The outcome of measurement should be reproducible by other studies which apply the same method on the same sample. Thus, reliable measurement method does not produce unsteady or unpredictable results. (Adams, Khan & Raeside 2014, 245).

To ensure the stability and reproducibility the methodology of this study is based on the GRI G4 guidelines which offer a consistent metrics for the measurement. GRI guidelines offer a transparent and reliable basis for the measurement as all the requirements for each indicator are public and unambiguous. The companies included in this study were chosen on the basis that they published an GRI table in which they listed the indicators and the extent of published information on each indicator (wholly, partially or not disclosing information on an indicator at all). All the information on each indicator was carefully verified to be in accordance with the requirements of GRI guidelines. This enabled the measurement to be conducted in an objective and reliable manner, and subjective estimation was not required. Also, all information is gathered from publicly available reports produced by the companies. Thus, future studies which are conducted by similar method of measurement will produce the same results as this study.

It had to be decided whether to use weighted or unweighted index. Using weighted indices would have required the assignment of more importance and value to some of the environmental indices. This would have possibly increased the subjectivity of the analysis method (Bonsón-Ponte, Escobar-Rodríguez & Flores-Muñoz 2006, 720). To avoid the possibility of increased arbitrariness, unweighted disclosure index was used in this study. The disclosure index was formed simply by adding the disclosure scores allotted to each of the indices together.

When analyzing the reports of the companies included in the study, only the information given in the reports has been taken into consideration. Further examination such as the truthfulness of reported information or external assurance of the reports has not been considered.

7.2.3 Validity

Validity of a study requires that it is accurate measuring what it is supposed to measure (Adams et al. 2014, 248). To assess validity of a study it must be considered whether it measured the concept that it was supposed to measure. Thus, validity requires that relevant data is used and that the study is able at making inferences about the phenomenon under study.

This study utilized a disclosure index which was based on prior studies (Gallego-Álvarez's & Quina-Custodio's 2016; Tarquinio et al. 2018; Cappuyns et al. 2015).

The main objective of this study was to evaluate the extent of environmental disclosure among the publicly listed companies in Finland. To ensure the validity this study utilized the GRI guidelines. It is widely conceded that GRI standards provide good basis for organizations to present their transparency and progress in sustainability (Belkhir, Bernard & Abdelgadir 2017, 139). GRI standards are the most widely applied sustainability metrics in the world (Gallego-Álvarez & Quina-Custodio 2016, 219). This

enhances the comparability of the measurement. Also, GRI guidelines enable to track environmental performance and progress in a quantitative manner. This enhances the relevance of this study.

7.3 Suggestions for further research

The sample of this study was relatively small as only 53 companies were included. It is suggested that future studies would study the extent of environmental disclosure in the Finnish context with a larger sample of companies. Larger sample produces more robust results and enhances reliability. Also, because of the relatively small sample the industry samples were small. Studies with a larger sample would potentially produce different results than this study.

This study has empirically examined the extent of environmental disclosure by applying a method which was based on the GRI guidelines. The results differed significantly from prior studies conducted in different countries. It is suggested that also different methodologies would be applied in future studies to study the extent of environmental disclosure of Finnish publicly listed companies. Different methodologies of measurement in future studies would enable a more comprehensive knowledge on the extent of environmental disclosure in the Finnish context as they would possibly produce different results. For example, count of environmental words could be used as a unit of measurement.

Finally, this study analyzed data from one year only. It is suggested that future studies would include data from a longer period. This would enable the researcher to evaluate the progress in the extent of environmental disclosure in a more comprehensible manner.

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Appendix A: Disclosed indicators of the studied reports

Table A1: Excerpt of disclosed indices

G4 Disclosure	Disclosure Title	Ahlstrom-Munksjö	Aktia Pankki	Alma Media	Altia
Materials					
G4-EN1 (301-1)	Materials used by weight or volume	0	1	1	0,5
G4-EN2 (301-2)	Recycled input materials used	0	0	0	0
Energy					
G4-EN3 (302-1)	Energy consumption within the organization	0	1	1	1
G4-EN4 (302-2)	Energy consumption outside of the organization	0	0	1	0
G4-EN5 (302-3)	Energy intensity	0	0	0	0
G4-EN6 (302-4)	Reduction of energy consumption	0	0	1	0,5
G4-EN7 (302-5)	Reductions in energy requirements of products and services	0	0	1	0
Water					
G4-EN8 (303-1)	Water withdrawal by source	0	0	0	0,5
G4-EN9 (303-2)	Water sources significantly affected by withdrawal of water	0	0	0	0
G4-EN10 (303-3)	Water recycled and reused	0	0	0	0
Biodiversity					
G4-EN11 (304-1)	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	0	0	0	0
G4-EN12 (304-2)	Significant impacts of activities, products, and services on biodiversity	0	0	0	0
G4-EN13 (304-3)	Habitats protected or restored	0	0	0	0,5
G4-EN14 (304-4)	IUCN Red List species and national conservation list species with habitats in areas affected by operations	0	0	0	0
Emissions					
G4-EN15 (305-1)	Direct greenhouse gas emissions (Scope 1)	1	0	1	0,5
G4-EN16 (305-2)	Energy indirect greenhouse gas emissions (Scope 2)	0	1	1	0,5
G4-EN17 (305-3)	Other indirect greenhouse gas emissions (Scope 3)	0	1	1	0
G4-EN18 (305-4)	Greenhouse gas emissions intensity	0	0	0	0
G4-EN19 (305-5)	Reduction of greenhouse gas emissions	0	0	1	0
G4-EN20 (305-6)	Emissions of ozone-depleting substances (ODS)	0	0	0	0
G4-EN21 (305-7)	Nitrogen oxides (NOX), sulfur oxides (SOX), and other significant air emissions	0	0	1	0,5
Effluents and Waste					
G4-EN22 (306-1)	Water discharge by quality and destination	0	0	0	1
G4-EN23 (306-2)	Waste by type and disposal method	0	0	1	1
G4-EN24 (306-3)	Significant spills	0	0	0	0
G4-EN25 (306-4)	Transport of hazardous waste	0	0	0	0,5
G4-EN26 (306-5)	Water bodies affected by water discharges and/or runoff	0	0	0	0
Products and Services					
G4-EN27	Extent of impact mitigation of environmental impacts of products and services	0	1	0	0
G4-EN28	Reclaimed products and their packaging materials	0	0	0	0
Environmental Compliance					
G4-EN29 (307-1)	Non-compliance with environmental laws and regulations	0	0	0	1
Transport					
G4-EN30	Significant environmental impacts of transporting products and other goods and materials for the organization's operations, and transporting members of the workforce	0	0	0	0
Overall					
G4-EN31	Total environmental protection expenditures and investments	0	0	0	0
Supplier Environmental Assessment					
G4-EN32 (308-1)	New suppliers that were screened using environmental criteria	0,5	0	0	0
G4-EN33 (308-2)	Negative environmental impacts in the supply chain and actions taken	0	0	1	0,5
ENVIRONMENTAL GRIEVANCE MECHANISMS					
G4-EN34	Number of grievances about environmental impacts filed, addressed, and resolved through formal grievance mechanisms	0	0	0	0
	Points	1,5	5	12	8,5
	Index	4,41	14,71	35,29	25,00

Table A2: Excerpt of disclosed indices

Amer Sports	Apetit	Atria	Bittium	Cargotec	Caverion
0	1	1	0	0	0
0	0	0	1	0	0
1	1	1	1	1	1
0	0	0	0	0	0
0	1	1	0	1	1
0	1	1	0	0	1
0	0	0	0	1	0
0	1	1	1	1	0
0	0	0	0	0	0
0	0	0	0	0	0
0	1	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
1	0	1	0	1	1
1	0	1	0	1	1
1	0	0	0	0	0
1	0	0	0	1	1
0	0	0	0	0	1
0	0	0	0	0	0
0	0	0	0	1	0
0	1	1	0	0	0
1	0	1	1	1	0
0	0	1	0	1	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	1	0
0	0	0	0	0	0
0	1	1	0	0	1
0	0	0	0	0	1
0	0	0	0	0	0
0	0	1	0	1	0
0	0	0	0	0	0
0	0	0	0	1	0
6	8	12	4	13	9
17,65	23,53	35,29	11,76	38,24	26,47

Table A3: Excerpt of disclosed indices

Citycon	Cramo	DNA	Elisa	Etteplan	Finnair
0	0	0	0	0	0
0	0	0	0	0	0
1	1	1	1	0	1
1	0	1	0	0	0
1	1	0	1	0	1
0	0	0	1	0,5	1
0	1	0	1	0	1
1	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
1	0	0	0	0	0
0	0	0	0	0	1
0	0	0	0	0	0
0	0	0	0	0	0
1	1	1	1	0	1
1	1	1	1	0	1
1	1	1	1	0	1
0	1	1	1	0	1
1	0	0	0	0	1
0	0	0	0	0	0
0	0	0	0	0	1
1	0	0	0	0	0
1	1	1	1	0	1
1	0	0	1	0	1
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
1	0	0	1	1	1
0	0	0	0	0	0
0	0	0	0	0	0
1	0	1	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
14	8	8	11	1,5	14
41,18	23,53	23,53	32,35	4,41	41,18

Table A4: Excerpt of disclosed indices

Fiskars	Fortum	HKScan	Huhtamäki	Kemira	Kesko
0	1	1	1	1	0
0	1	1	1	1	0,5
1	1	1	1	1	1
0	0	0	0	0	0,5
1	1	0	1	1	1
0	1	1	1	1	1
0	0	0	0	0	0
1	1	1	1	1	1
0	0	0	0	0	0
0	0	0	0	1	0
0	0	0	0	0	0
0	0	0	0	0	1
0	1	0	0	0	1
0	0	0	0	0	0
1	1	1	1	1	1
1	1	1	1	1	0,5
0	1	0	0	1	1
1	1	0	1	1	1
0	0	1	1	1	1
0	0	0	0	1	0
0	1	0	0	1	1
0	1	0	0	1	0
1	1	1	1	1	1
1	1	0	0	1	0
0	0	0	0	1	0
0	0	0	0	0	0
0	0	0	1	0	0
0	0	0	0	0	0
0	1	1	0	1	0
0	0	0	0	0	0
0	0	0	0	0	0
1	0	0	0	1	0
0	1	0	0	0	0
0	0	0	0	0	0
9	17	10	12	20	13,5
26,47	50,00	29,41	35,29	58,82	39,71

Table A5: Excerpt of disclosed indices

KONE	Konecranes	Lassila & Tikanoja	Marimekko	Martela	Metso
1	0,5	1	0	1	0
0	0	1	0	1	0
1	0,5	1	1	1	1
0	0	0	0	0	0
0	0	1	0	0	0
1	0	1	0,5	0	1
1	0	0	0	0	0,5
1	0	0	0,5	0	1
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
1	0,5	1	0,5	1	1
1	0,5	1	0,5	0,5	1
1	0,5	1	0	0	1
1	0,5	1	0	0	0
1	0	1	0	0	1
0	0	0	0	0	0
0	0	0	0	0,5	0
0	0	0	0	0	0
1	0,5	0	0,5	1	1
0	0	1	0	0	1
0	0	0,5	0	0	0
0	0	0	0	0	0
1	0	0	0,5	1	0
0	0	0	0	0	0
1	0	1	0	0	0
1	0	0	0	0	0
0	0	0	0	0	0
1	0,5	1	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
15	4	13,5	4	7	9,5
44,12	11,76	39,71	11,76	20,59	27,94

Table A6: Excerpt of disclosed indices

Metsä group	Neste	Nokia	Nokian Renkaat	Nordea	Outokumpu
1	1	0,5	1	0	0
1	1	0	1	0	1
1	1	1	1	1	1
0,5	1	1	0	0	0
1	1	1	1	1	1
1	1	1	0	0	0
0	1	1	0	0	0
1	1	1	1	0	1
1	1	0	0	0	0
1	1	1	0	0	0
1	0	0	0	0	1
1	0	0	1	0	0
1	0	0	0	0	0
1	0	0	0	0	0
1	1	1	1	1	1
1	1	1	1	1	1
0,5	1	0,5	0	1	1
1	1	1	1	1	1
1	1	1	0	0	0
0	1	0	0	0	0
1	1	1	1	0	1
1	1	0	1	0	1
1	1	1	1	0	1
1	1	0	0	0	0
0	1	0	0	0	0
1	1	0	0	0	0
0	0	0	1	0	0
1	1	1	0	0	0
1	1	1	1	1	1
0	0	0	0	0	0
0	0	0	0	0	0
1	1	1	0	1	1
1	1	1	0	1	0
0	0	0	1	1	0
26	26	18	15	10	14
76,47	76,47	52,94	44,12	29,41	41,18

Table A7: Excerpt of disclosed indices

Outotec	Raisio	Ramirent	Saga Furs	Sampo	Sanoma
1	1	0	0	0	1
0	0	0	0	0	0
1	1	0,5	1	0	1
0	0	0	0	0	0
1	1	0	0	0	0
1	1	0	0	0	0
0	0	0	0	0	0
1	1	0	1	0	0
0	0	0	0	0	0
0	0	0	0	0	0
1	1	0	0	0	0
1	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
1	1	0	0	1	0
1	1	0	0	1	1
1	0	0	0	1	0
1	1	0	0	0	0
1	1	0	1	0	0
0	0	0	0	0	0
1	0	0	0	0	0
0	1	0	0	0	0
1	1	0,5	0	0	0
1	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
1	1	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
1	0	0	0	0	0
1	0	0	1	0	0
0	0	0	0	0	0
18	13	1	4	3	3
52,94	38,24	2,94	11,76	8,82	8,82

Table A8: Excerpt of disclosed indices

SSAB	Stockmann	Stora Enso	Technopolis	Telia Company	Tieto
1	0	1	0	0	0
1	0	1	0	0	0
1	1	1	1	1	1
0	1	0,5	1	0	0
1	0	1	1	1	0
1	0	1	1	1	0
0	0	0,5	1	0	0
1	1	1	1	0	0
0	0	1	0	0	0
0	0	0,5	0	0	0
0	0	1	1	0	0
0	0	1	0	0	0
0	0	1	0	0	0
0	0	0,5	0	0	0
1	1	1	1	1	1
1	1	1	1	1	1
1	1	1	1	1	1
1	0	1	1	1	0
1	0	1	1	1	0
0	0	1	0	0	0
1	0	1	0	0	0
0	0	1	0	0	0
1	1	1	1	1	0
0	0	1	0	0	0
0	0	0,5	0	0	0
0	0	1	0	0	0
0	0	1	0	0	0
0	1	1	0	0	0
0	0	1	1	0	0
0	0	1	0	0	0
0	0	1	0	0	0
0	0	1	1	1	0
0	0	1	1	0	0
0	0	1	0	0	0
13	8	31,5	16	10	4
38,24	23,53	92,65	47,06	29,41	11,76

Table A9: Excerpt of disclosed indices

Tikkurila	Tokmanni Group	UPM	Vaisala	Valmet	Wärtsilä	YIT
1	1	1	0	0	1	0
0	0	1	0	0	1	0
1	1	1	1	1	1	1
0	0	0	1	0	0	0
0	1	1	1	1	1	1
0	0	1	1	0	1	0
0	0	0	0	0	0	0
1	0	1	1	1	1	0
0	0	1	0	0	1	0
0	0	0	0	0	1	0
0	0	1	0	0	0	0
0	0	1	0	0	0	0
0	0	1	0	0	0	0
1	1	1	1	1	1	0
0	1	1	1	1	0,5	0
0	1	1	1	1	1	0
0	1	1	1	1	1	0
0	1	1	1	0	0,5	0
0	0	0	0	0	0	0
1	0	1	0	1	1	0
0	0	1	0	0	1	0
0	1	1	1	1	1	0
0	0	1	0	1	1	0
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	1	1	1	1	1
0,5	0	0	0	0	0	0
1	0	0	0	0	0	0
0	1	1	1	0	0	0
0	1	1	0	0	0	0
0	0	0	1	0	0	0
6,5	11	24	14	11	17	3
19,12	32,35	70,59	41,18	32,35	50,00	8,82